# Developing a Framework for a Minority Language-based Utility

by

Marco Antonio Monroy Fonseca
B.S. Computer Science
Instituto Tecnológico y de Estudios Superiores de Monterrey
Atizapán, Mexico
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Signature of Author _____

Program in Media Arts and Sciences
May 17, 2002

Certified by _____

Walter Bender
Senior Research Scientist
MIT Media Laboratory
Thesis Advisor

Accepted by _____

Andrew B. Lippman
Chairperson
Departmental Committee on Graduate Students

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**The following people served as readers for this thesis**

Reader

Manuel Gándara
Research Coordinator
Centro de Cultura Digital
Inttelmex

Reader

David Cavallo
Principal Research Associate
Future of Learning Group
MIT Media Lab

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## Abstract

While several efforts have been carried out for connecting ethnic groups to the Internet, few of them have been executed in developing countries, where lack of connectivity infrastructure prevents access of indigenous groups online, creating a less diverse World Wide Web where only few languages are present.

Based on the reversal language shift theory of Fishman, and using HDL as the technology approach, I propose a framework for deploying an online collaborative environment for enhancing the presence of minority languages on the Internet. As part of this objective, this thesis documents several steps taken for deploying a HDL web server in Oaxaca, Mexico, with the participation of two native organizations in its conception. I point out positive as well as negative aspects of the experience that occurred during the process.

Thesis Supervisor: Walter Bender
Senior Research Scientist, MIT Media Laboratory

**The author gratefully thanks the Telmex Fellows Program for its support and input into the development of this research.**

# Dedication

I dedicate this work to the memory of my abuelita Delfina Robledo, a native Hñahñu (Otomí) of the State of Mexico, who went to the Capital City seeking better life opportunities, as many indigenous people continue to do today. Thanks to her, I know more about my origins, both Indigenous and European. She has always encouraged me to do my best in my life. Que Dios la proteja por siempre...

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Being part of the MIT Media Lab became something important in my academic and personal life. During this time I knew interesting people and projects, and I acquired new knowledge not only on technology-related topics, but also about the importance of education and social sciences in technology. It also meant a time for meeting new people, and exchange ideas with them.

My readers have been a source of knowledge and guidance for the thesis. First and foremost I would like to thank my advisor Walter Bender, who has been a great support in my Master's. A part of this work was possible thanks to his assistance, as well as putting my ideas in order. Manuel Gándara also deserves much of my respect; he introduced me to wonderful people and places in Oaxaca. He also inspired me to do a thorough research on the theory and practice of the framework, and provided much of the feedback. David Cavallo provided valuable commentaries for this research, which is was also possible due to his invitation to participate in the Summer Institute in 2001.

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# Chapter 1. Introduction

**"We believe that language is one of God's most important gifts to man, and of all human characteristics, language is the most distinctly human and the most basic. Without language, culture and civilization would be impossible".**

**"We believe that any language is capable of being a vehicle for complicated human interaction and complex thought, and can be the basis for a complex culture and civilization".**

**"All languages are worthy of preservation in written form by means of grammars, dictionaries and written texts. This should be done as part of the heritage of the human race".**

-- Excerpts of the Linguistic Creed, Benjamin F. Elson (1987)
Summer Institute of Languages

**"When you lose a language, a large part of the culture goes, too, because much of that culture is encoded in the language".**

-- Kenneth L. Hale (1934-2001)

These passages clearly describe the importance of human language for communicating. In language, the human being has found a way of expressing himself in a thorough way. With human evolution, people have created alternate forms of expressing themselves: some of them developed a written system, others used sound for conveying meaning, others developed images or pictograms, and all groups developed body expressions and gestures. No matter how it expresses, there has always been an inherent need to communicate with others. Independent of the means we employ, it is certain that languages have taken different forms. One of such forms is reflected on the existence of diverse spoken and written languages, in the form of alphabets and phonemes, and the diversity found within. The planet comprises a collage of natural and social environments, and proof of such diversity resides on language variety.

However, the current language panorama constructs a dark scenario: according to the UNESCO [2002], half of the 6,800 languages spoken on Earth risk extinction and can become extinct by the end of the century. Among the reasons

for language extinction are ethnic conflicts, language policies adopted by governments, as well as adopting a majority language, especially those that have a global presence.

The threat to the preservation of minority languages is heightened with the appearance of groundbreaking communication technologies, especially those that are computer-based: electronic mail, discussion groups, the Internet, among others. The need for fast means of communication has had an impact on the languages spoken throughout the world. Despite the existing diversity of languages, it seems that such variety has not been portrayed in new electronic media. For instance, almost three-quarters of the World Wide Web content is presented in English. In addition, another 25 percent of such content is expressed in another ten languages, all of them Asian or European. From this data it can be inferred that the digital gap is not just about access to computer technology; it is also about having a voice on such "new media".

Some of the population sectors that have not benefited from such resources are indigenous communities[1]. Throughout history, native communities in several parts of the world have been either segregated or eliminated. Those that have survived this process have below-average life standards, generally living in pauper conditions and with limited access to basic needs. They are usually located in rural, isolated settings in the country, with very limited access and therefore little contact with the surrounding localities. As a consequence, native communities have evolved in their own ways, establishing their own norms, customs, and language.

What is the consequence of this current scenario? There is still a gap in the access of computer resources for giving presence to native languages in alternate media. While it is true that some minority languages have some media coverage by means of local newspapers or community radio stations, such means need in some way to be complemented for preserving the language, especially if we deal with a migrating community [Conway and Cohen, 1998; Rivera-Salgado, 1999]. In any case, if the presence of minority language diminishes with time, mainstream languages will gradually replace those minority languages that do not have an adequate distribution and preservation. This is strongly emphasized in languages that are not recognized as "official" within a nation's context. If such tendency continues, native languages can disappear and with them a way of interpreting the world.

[1] I will use the terms "indigenous communities" and "native communities" for describing the same sector of population: native groups already established before the colonization period in the sixteenth century. Other applicable names, from an American continent perspective, include "Native Americans" and "First Nations".

What can be done for reducing the digital gap among languages? What are the challenges encountered for achieving such goal? What are the technologies that can help in this objective? And how to engage people in this language empowerment process?

## 1.1 The purpose of this thesis

The main objective of the present document is to propose a framework for preserving a minority language, which could be further applied and adapted to other contexts. I define framework as a two-part technological solution:

(1) The development of software for displaying native languages using an online collaborative approach.
(2) A methodology proposition describing the required steps for achieving the mentioned goal.

For the development of the referred framework, two disciplines are combined in this thesis: social sciences and computer science. I opted for this perspective because technology plays an important role in the social behavior of the human being. By applying a carefully planned design to the technological solution, one can expect positive results from that encounter. Nevertheless, unexpected situations can also arise from those interactions, leading to unwanted results.

The technology component of this work comprises the definition of the "online publishing" approach as well as a brief discussion of its implantation. It also justifies the viability of computer technologies for connecting a minority-language speaking community to the Internet. In addition, this component also comprises a discussion of the deployment of a web server in a location with limited connectivity services.

The social component of the thesis comprises a justification of preserving minority languages in a world characterized by integrationist policies done by several countries. It also examines the role that social structures play in the adoption of the proposed technologies, as well as suggesting a "social structure" in the developed software. It also allows the reader to get acquainted with the current situation lived in the indigenous communities, and how technology can contribute in the solution of social problems.

For verifying the viability of the defined framework, it will be tested with a pair of organizations that use an indigenous language as a form of communication. Such framework will be tested in the Mexican state of Oaxaca, where several native communities have already been present for centuries.

## 1.2 Overview of the thesis

This thesis is divided in two main parts. The first part corresponds to the theoretical framework of the research, presenting the theory behind language loss and revival, as well as an overview of electronic publishing as a form of engaging a user as an active information producer. The second part comprises a description of the fieldwork carried out in the geographic setting of Oaxaca.

Chapter 2, "A long way to becoming global: Indigenous nations and the Internet", describes the current situation of the Internet related to language presence in such medium. This chapter presents an argument on the conservation of minority languages, as well as a demonstration that adoption of new technologies does not necessarily imply a cultural shift of the population. Examples of current minority groups on the Internet are presented as well.

Chapter 3, "Active Community Publishing", presents the online collaboration model, and its application in a project named SilverStringers. The proposed technology solution, a collaborative software called HDL, is also examined, describing the journalistic model in which it is based. An online publication is proposed as the technology solution for the minority-language framework. The chapter concludes with a justification of community publishing as a model for language revival.

Chapter 4, "Under the *guaje* tree hill: Profile of the research location", introduces the region in which the project was carried out: the state of Oaxaca in Mexico. The chapter starts with an overview of minority languages in Mexico, and justifies the selection of Oaxaca as the research place. As a second point, the chapter provides an introduction to specific cases of social organization as well as the language situation. A first framework proposal is presented as well.

Chapter 5, "Implementation and Evaluation of the Proposed Framework", describes all the process for deploying the online publication, from the contact of organizations to the launching of the online publication. Emphasis is put on several problems encountered in the process, including connectivity, project finance and the interface. At the end, an overall evaluation of the process is presented.

Chapter 6, "Conclusions", describes the contributions of this project and proposes future research directions of this initiative.

# Chapter 2. A long way to becoming global: Indigenous nations and the Internet

It is undeniable that the Internet has had influenced on the ways of life of people since the past decade. Now it has become a daily component in most of the developed world and has been expanding in developing countries. It seems that distance barriers have been eliminated: e-mail messages, instant messaging, and videoconferences enable participants to engage in interactions in which participants are located at a considerable distance. Using a browser, any user can log on to assorted web sites seeking information, news, or entertainment. Text, images and sounds create a rich multimedia environment in which such information is enhanced.

Of all the variables that make up the Internet[2], one of the aspects that will be treated in this work is the language in which the information is presented. Depending on who authors and manages the website or server, data is presented in the human languages we use to communicate, in a written or oral format. The choice of languages, naturally, depends sometimes in the target audience in which the site is aimed at. For example, a corporate site with branches scattered around different countries may require to be coded in several languages[3].

For understanding the relationship between languages and the Internet, there are basic questions that need to be answered: (1) How many languages are spoken in the world? (2) How many languages are present on the Internet today? (3) Is there a correlation between the access to the Internet and the presence of a language in this environment?

First of all, it is important to distinguish two different variables: language content of the Internet (i.e., in which language is the information displayed or presented to the user) and the profile of people who get access to the Internet based on their native language. From quantitative analysis [USIC and ITTA, 2000], it has been demonstrated that the number of people browsing the Internet does not necessarily correlate with the quantity of information in their native languages. As

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[2] In this text the term *Internet* will be defined as all information that can be retrieved with a browser, accessible using an IP address or a Domain Name Service. Such information includes text, images, sounds, video content, or other documents elaborated with paid or free software.

[3] And in some cases, target audiences may define the language in which a page is coded, depending on the topic, and independent from the country in which the page is located. I propose the reader to do a simple exercise: open your favorite search engine and type the name of a popular tourist destination, regardless the country. Compare and contrast the location of the place you typed with the language of the documents retrieved. Similar cases occur with certain kind of documents (research papers for instance) coded in a universal language (nowadays English).

a case study, Eastern Asians have been a group that got access to the worldwide web recently: they have even displaced North Americans in terms of which ethnic group has the most number of users connected to this network. Nevertheless, the predominant language on the web is still English. The Current State of the Internet report (2000) clearly summarizes the issue,

> Seventy-eight percent of all websites are currently in English, while 96 percent of e-commerce sites are in English. Additionally, 70 percent of all websites originate in the U.S. and the vast majority of these are in English [USIC and ITTA, 2000: 2].

Figures 2-1 and 2-2 illustrate the most recent data available concerning the web content and the estimated online population on the Internet, both variables based on language. As it can be observed, there is some disparity between the proportion of persons that are online and the language content to which they have access. It is noticeable, for example that, contrasting the year 2002 data with the year 2000 data mentioned above, the proportion of English users as well as the English content has diminished. However, English is still ranks first in language presence. Asian languages such as Chinese[4], Japanese and Korean rank among the top ten, and the other positions are occupied by mostly Western European languages, such as Spanish (due to an increasing tendency in Latin America and the Hispanic population in the United States), French and German.

A more astonishing fact is evident when the online presence of language on the Internet is compared with the actual presence of languages around the world, as exhibited in Figure 2-3. It can be perceived that four of the most spoke languages of the world (among them languages of the Indian subcontinent and Arab), still do not rank among the ten most prominent languages on the cyberspace.

This is the stating point of the analysis of the relationship between the Internet and minority languages. The first section portrays an overall scenario of the current state of minority languages around the world, as well as the problems encountered for their preservation and transmission. Next, the relationship between technology assimilation and culture preservation is discussed, arguing the viability of this path for providing a communication channel for the minority language groups. Finally, some case studies of current websites in which there is a presence of minority or indigenous groups on the Internet are presented, as well as including a brief analysis of their content.

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[4] In this case, as well as in Figures 2-1 and 2-2, 'Chinese' refers to all the existing variants of the Chinese Language (Mandarin, Cantonese, Wu, and others), provided that they share the same set of characters, and thus are mutually understandable in the written form.

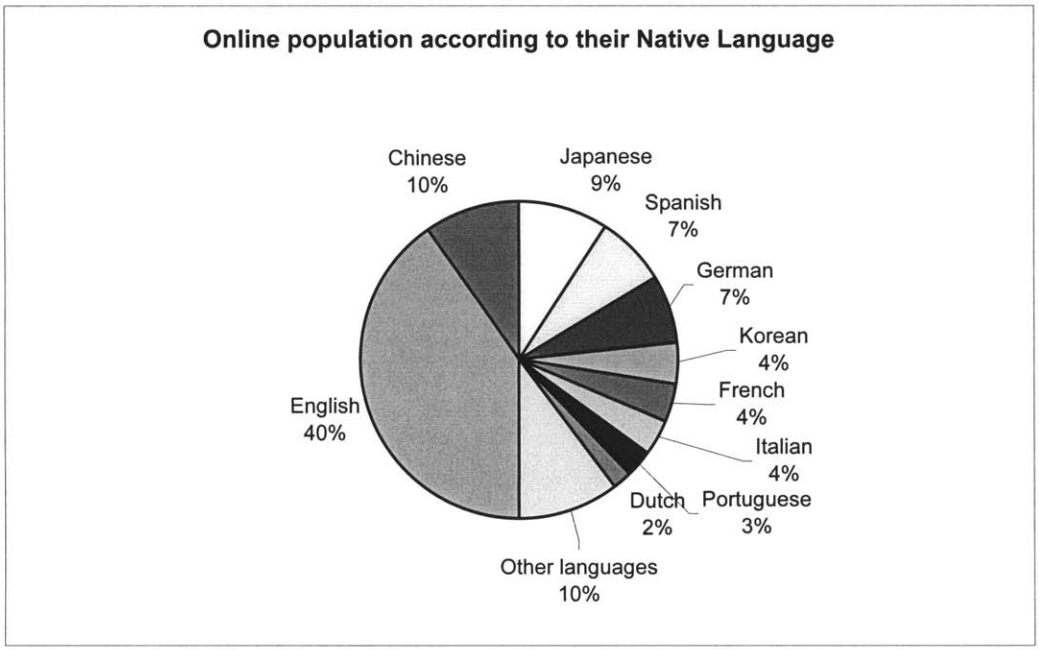


**Figure 2-1:** Online users classified by native language as of March 2002 (source: adapted from Global Reach, http://www.glreach.com/globstats/index.php3).

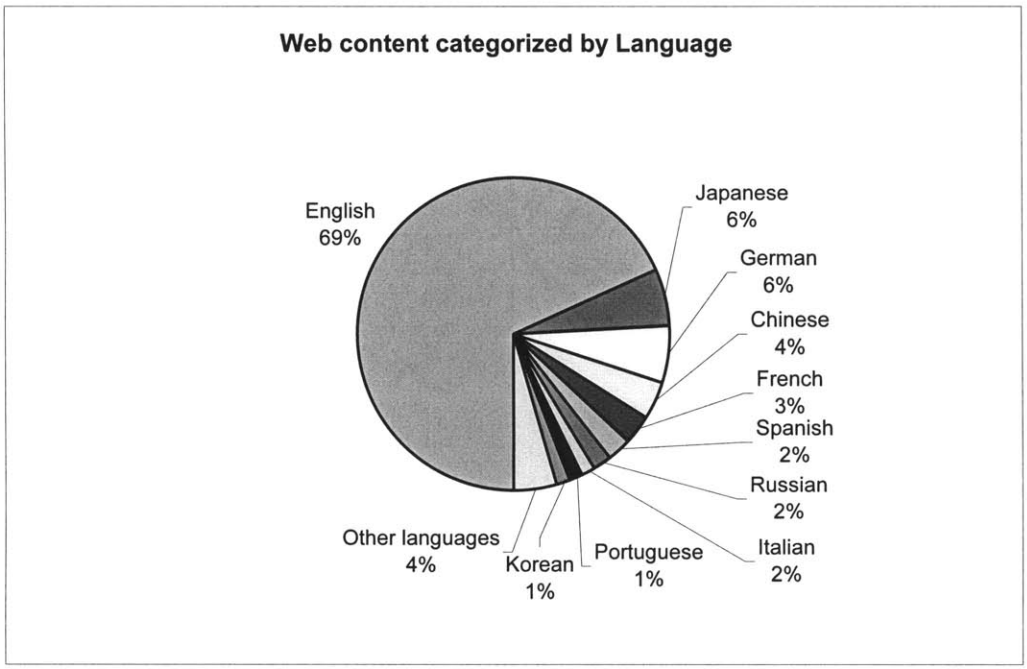


**Figure 2-2:** Web content classified by language as of March 2002 (source: adapted from Global Reach, http://www.glreach.com/globstats/refs.php3).

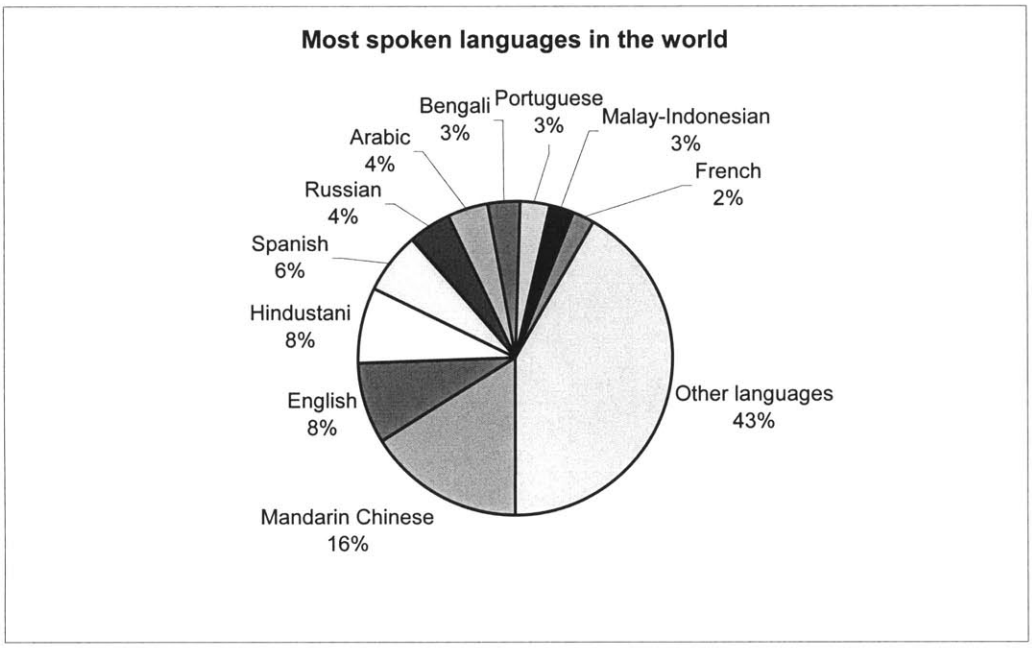


**Figure 2-3:** Most spoken languages in the world, based on the number of people who speak a language, either as a native or as second language (source: adapted from [Grimes, 1996]).

## 2.1 An overview of minority languages

It is undeniable that languages have gone through an evolution process, and are constantly influenced by other languages. In the same way, there are languages that have seen diminished their speaker numbers and have become extinct. It is though that at one point, there were 10-15,000 languages in the world, and that half of the languages have died out during the past five hundred years [Matthews and Polinsky, 1996].

According to the Summer Institute of Languages, one of the leading institutions dedicated to the study of languages, there are approximately 6,800 languages spoken in the world [Grimes, 1996]. Of those languages, it has been projected that approximately half of them will be lost in the course of the present century [Wurm, 2001][5]. According to the UNESCO, any given language requires a minimum of 100,000 speakers to be considered as "not threatened".

[5] Matthews and Polinsky compare the process of loss of languages with the extinction of animal or vegetal species: "Destruction and industrial exploitation of the natural habitat lead to a breakdown of the communities in which the minority languages survive. Just as we do not know

Why do languages become extinct? Several social factors determine the language dynamics, such as colonization of 'desert' territories, mostly done by West European settlers. The conquistadors colonized much of what is now called Latin America, while English and French settlers set in North America and Caribbean islands, just to mention a couple of examples. Such displacement or annihilation processes kept occurring in the course of the centuries. In addition, tribes have suffered from diseases and plagues brought by the settlers. Take for instance alcoholism: alcohol was known by several pre-Columbian cultures before the arrival of the Europeans, but its use was strictly controlled by social norms. After the conquest, the disease became widely spread, and now is a recurrent problem in several indigenous cultures of the American continent[6] [Del Rio, 1992].

However, the main factor of the loss of languages involves 'language shift': speakers adopt the language of the majority, or those related with the prestigious or wealthy classes in the region [Fishman, 1991]. Normally the process occurs in the course of three generations.

(1) The first generation is monolingual and learns little of the dominant language.
(2) The second generation becomes bilingual, learning the ancestral language of their parents and the dominant language from the surrounding community.
(3) The third generation learns only the dominant language both at home and in the community.

There are countless examples that lend validity to this theory in the developed world, especially in those countries that have received a great influx of immigrants. Nevertheless, there are groups that resist the cultural and language shift process. Those that have challenged the foreign colonization waves have suffered several destinies. In some cases, the 'privileged' groups have eliminated indigenous groups, or have confined them in certain patches of land. Other native groups cohabitated with the newly arrived colonizers, sometimes resulting

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what natural medicines lie within vanishing rainforests, we do not what wisdom is recorded in the grammar and vocabulary, poetry and stories of dying languages, many of which have vanished without being studied in depth" [Matthews and Polinsky, 1996: 212].

[6] Among the Aztecs, as well as other Mesoamerican cultures, alcoholic beverages (and thus drinking) were restricted to elderly people or high classes; violators of this law were punished with death. With the arrival of the Spaniards and their institutions (including the Catholic church), drinking became a widespread activity within inhabitants of the country. Nowadays, in religious festivities, getting drunk is a common practice, and even the smallest town has a drinking bar in it. Del Rio [1992] presents some interesting arguments on the role of the Catholic Church in the colonization of Mexico, as well as its consequences on its indigenous nations.

in what is called a 'mestizaje'[7] of the cultures (with the consequent cultural shift, including language). A final possibility was that the native groups escaped and settled in locations with difficult access, such as mountain ranges or evergreen forests, resulting in isolation.

Still today, in the 21st century, there are hundreds of ethnic groups that resisted the Colonial era, and most important, have made their culture survive, sometimes in conditions that in Western standards could be declared as inhumane, living in pauper conditions and with limited access to basic needs. Such native groups are usually located in rural, isolated settings within a country, conserving their very limited access and therefore little contact with the surrounding localities. As a consequence, those native communities have evolved in their own ways, establishing their own norms, customs, and language, and in some way isolated of the 'national' reality in which the rest of the country lives.

Those cultures that have taken the path of the 'mestizaje', and thus have integrated the national society, have had to shift some of their primary identities, probably because of the fear of being rejected, or because they are 'different' to the majority (in terms of language, customs or other human factors). Therefore, the language shift process described above clearly applies, and stimulates the constant loss of languages.

New intriguing questions arise: Can threatened languages be saved? Is it possible to conserve minority languages? Why it this process so difficult? As Fishman [2001a] points out, to strengthen a minority language is a very difficult task provided that

(1) The loss of a traditionally-associated ethnocultural language is commonly the result of many long-ongoing departures from the traditional cultures...
(2) Organizing on behalf of a traditionally associated but weakened language is competitively depicted and regarded as "social mobility contraindicated, parochial and anti-modern"
(3) In order to defend a threatened language some of its functions must be both differentiated from and shared with its stronger competitor, a tactically difficult allocation to arrive at and to maintain [op. cit.: 21].

[7] I prefer to use the Spanish term for "the mixing of two or more different cultures". In English the term can be translated in two senses: 'miscegenation', a term that describes a forced union of two different races for the sole purpose of producing children; and 'crossbreeding', that is just restricted to animals and plants (and, personally, a more pejorative term for describing the process). While the definition of 'miscegenation' clearly describes a part of the historical context (the fusion among colonizing and native cultures), it does not enclose all the cultural significance of the phenomenon.

However, Fishman also concludes that "[threatened languages can be saved], but only by following careful strategies that focus on priorities and on strong linkages between them, and only if the true complexity of human identity, linguistic competence and global interdependence are fully recognized" [Fishman, 2001b]. For achieving such ideal, Fishman proposes a methodology known as 'reverse language shift'. Such methodology consists of the revitalization of indigenous languages that were at one stage displaced by colonizing languages. This objective also comprises the daily use of the minority language in an oral and written basis, as well as being present in aspects of the national society [Fishman, 1991].

There are countless examples of how minority language groups have won battles for recognition and preservation within a nation, from the mandatory use of French in Quebec [Bourhis, 2001], to revitalization of endangered languages such as Maori in New Zealand [Benton and Benton, 2001] and Hawaiian in the state of Hawaii [Donaghy, 1998], which has even achieved recognition in higher education. There are also detractors of the multilingual scenario, arguing that "one language per country is enough" [Fishman, 2001b: 456] [8]. The most famous case resides in the 'English only' legislations[9], already in effect in 26 states in the United States [Reyhner, 2001]. One of the several problems confronted by these proposals is not just aiming at minority groups for assimilating the language of the majority; it also creates conflicts with existing laws, such as the Native American Languages Act of 1990 [op. cit., 2001: 23].

Hence, there is the need of examine alternate mechanisms of preserving and empowering a minority language. The main purpose is to provide an additional communication channel for the group in which they can 'speak out' and tell that they are also part of a nation or state, and that their opinion is also valid. It is well known that since some decades ago, several institutions have centered their efforts in the rescue and preservation of endangered languages, including many of their manifestations. The collected information is currently available in the form of vocabularies, grammars, folk heritage and oral stories, as well as other cultural elements. While several groups have documented the culture using traditional resources such as paper, audio or videotapes, other groups have recently ventured on documenting and transmit their language using the Internet.

For taking this crucial step it is necessary to think deeply about a core issue: how can technology help the cultural preservation of a minority group? And more

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[8] Fishman continues this caption with the phrase 'particularly if it is my language in my country', leading back to the idea of homogeneous countries in which one group should be the majority.

[9] The "English only" movement mandates that all services provided by the state (education, health services, welfare, paperwork, and so on) should be provided only in the English language, encouraging the minorities to integrate with the American society. Ironically, one of the principal promoters of such movement bears a Spanish surname [see Chavez, 1991; Reyhner, 2001].

important, is there a path to follow for achieving technology adoption relevant to this issue?

## 2.2 Technology adoption: an opportunity or a threat for indigenous culture?

Before venturing in the creation of a new technology infrastructure, several questions arise on the topic: (1) is it possible for indigenous communities to 'assimilate' new technologies into their way of life and thus maintain their culture? (2) Does the use or adoption of new technologies doom indigenous cultures, instead of helping them? (3) How open is the culture in other aspects of their life? (4) What are the consequences of such introduction of technology? (5) Would technology have the same implications as the integrationist efforts of the dominating ethnic groups of the nation? In a single question, are cultural preservation and technology separate issues or can they be complementary?

For answering these questions, it is important to define the relationship between the national context and the minority or indigenous groups. As mentioned in the past section, the majority group in any given country, under a unifying scope, generally dictates that the sense of belonging within a nation should be achieved by the 'integration' of all cultures under a same, homogeneous scope. But the disadvantage of this proposition is that the minority groups should give up some, if not all, of their particular culture features, including the language. Countless examples have happened in every nation around the world, ranging from the annihilation of ethnic groups for the establishment of new settlements in 'unsettled' lands, to the creation of 'civilization schools' in which their students "were taught to despise every custom of their forefathers, including religion, language, songs, dress, ideas, methods of living" [Reyhner, 2001: 23].

A similar description of this assimilation process is described by Castellanos [1999]:

> Native language speakers know very well what does it implies to learn Spanish, [...] due to the [social and economic] **overcoming expectations that arise with its knowledge**.
>
> Unfortunately, this tactic for learning the national language has provoked the disappearance of several aspects of the indigenous nations, beginning with language; such disappearance is possible due the idea of constant rejection of the local culture as a requirement to have access to the national culture... [Castellanos, 1999: 4, emphasis added].

Such perspectives clearly describe the concept of a dominating and dominated culture, despite that the 'dominated' culture is an essential component of the region where it belongs, as well as part of the cultural heritage of the place. Additionally, those groups who decide not to become part of this integrationist effort generally become isolated communities in which pauper conditions prevail. Even contradictory scenarios can exist, in which the richness of the natural resources of the region coexist with high marginalization of its inhabitants[10].

A proposed alternative to the 'integrationist' perspective resides on the 'autonomy-determination' or 'self-determination' of indigenous nations [Díaz-Polanco, 1985], in which instead of being subdued by a government or institution ruled by the majority, the minorities should define their own rules and legislations, but keeping in mind that they belong to a nation. In other words, the autonomy-determination perspective considers that the sense of 'nation' is not just the fact that people of several backgrounds compose it, but also states that it is necessary to respect and preserve their cultural assets, and that they can develop in an independent way, under a national unity, but defining their own priorities and rules. In other words, difference is positive for maintaining a national unity. Such perspective, for instance, is what the Zapatista movement, summarized in the San Andrés Accords ('Acuerdos de San Andrés'), has proposed to the Mexican government: a major recognition of indigenous culture in Mexico, and respect of their traditions and ways of life. However, the existence of voids and contradictions in laws dictated by the official government made that many of the terms of such accords were changed, modifying the original proposal[11].

How can these views of integration versus self-determination being applied from a technology assimilation perspective? Usually, a government creates uniform set of projects in which, they perceive, can benefit the entire population regardless their cultural assets. In some instances, a community can resist to these changes, probably because it can go against their beliefs or can affect their way of life. What should be done in this case? Should the government 'impose'

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[10] The state of Chiapas in Mexico is one of the best examples of this scenarios: some of the most important hydro-electrical projects of the nation are located in the state; in fact, Chiapas generates 10% of all the electricity produced in the country. In contrast, the majority of indigenous communities in the state do not have electricity, or other basic services such as running water [Rojas Nieto, 1998]. This is one of the various reasons for the Zapatista uprising of 1994.

[11] Such accords became one of the original demands of the Zapatistas to 'stop the war against the Mexican government' and became the beginning of important reforms in many Mexican laws, including the Constitution. However, the House of Representatives changed some of the demands enclosed in the San Andrés Accords, which resulted in the loss of the original scope of the petitions. As a consequence, the Zapatistas are still 'at war' with the Mexican government, despite the law was approved by the Senate. The "official" Zapatista website (http://www.ezln.org) contains general information on the Zapatistas as well as other documents, including the San Andrés Accords.

their program on the citizens? Should the government ban the community from subsequent national projects? Or should both parts accord options in which they can participate in the national project, and set specific goals for that community in particular? It is now evident that the 'integrationist' solution would favor for impose the project to the community, because 'it is good for them'. The 'self-determination' perspective on the other hand, will tend to review in which way the proposed solution would benefit or affect the community, provided their customs and traditions, and after a thorough evaluation, communicate their decision to the representatives. In fact, Díaz-Polanco suggests that this approach is centered on the idea not of "helping" minorities but of "empowering them", making their voices be heard on the national political arena, and making their opinions count.

A similar thing happens with technology in developing nations: in the specific domain of mass media, radio and the television existed long before the Internet boom. While they offered a new way of entertainment and an array of programming options and channels, it also exposed novel ways of life, modifying conduct patterns in people. All kinds of people, even those belonging to a minority of to a disfavored sector of population, are currently exposed to other ways of life, especially those of the mainstream population of a nation. As a consequence, there is this pressure for integration of the minorities, given the promise of a better way of life that can lead to a better economic well-being. One of the consequences is already known: cultural shift in minority communities, and with that, the loss of native customs.

In the same way, there are projects to introduce Internet communication to minority and isolated communities, and thus connect them to the world. But, do they really want to be connected? What could be the consequences? Will an Internet connection have the same consequences as mass media?

This is the central issue of this thesis: combining the core idea of using Internet as a new communication tool for native expression, how to develop a framework which make a minority **adapt** a technological solution instead of **being imposed** by a majority? Now that a theoretical foundation has been presented, it is possible to enumerate a series of steps for proposing a technological solution to a minority group.

(1) The first consideration is that the applied technology should not interfere or attempt to displace the native culture in any of its aspects. It is important to know beforehand what are the taboos and customs of the minority, as well as its importance for their culture.
(2) The second point is to focus the proposed technology to satisfy a current need or lack of service. Linked with this is a need to analyze what are the previous requirements to make the project work, and thus, avoid uselessness of the infrastructure deployed. As an example, a very

common scenario involves providing schools with computers, but the school (or the community) has no electricity or telephone lines[12].

(3) A third issue is to receive constant input from the community and, if possible, make them participants of the project. In other words, the community can 'adapt' the technology, visualizing possible solutions that even cannot be foreseen by the creators[13]. A very feasible scenario is that, considering that they are potential users for the proposed solution, they can participate in tests or simulations of real-life situations, for considering all possible scenarios when things can go right or wrong. Consequently, a follow up of the project is highly recommended.

(4) As a complement of the adoption of the technology, it is important to train some 'representatives' on how the solution works, so the community can eventually solve problems by themselves, without the need of external help, unless in extreme cases. An agreement should be reached also for transmitting such knowledge to other persons ('multiplier effect').

(5) Finally, solutions should be unique, tailored to the needs of the community or nation; not 'serial production' solutions. The reason is simple: communities are different and therefore have unique needs.

These should not be considered as an algorithm, but as guidelines for the adoption of technology. In some cases it would be successful, in others it would not work. Whatever the case, the respect of the native culture should be kept in consideration.

Nowadays there are many cases in which technology advances, such as social telephony or improvement of energy-efficient stove designs, have produced a benefit and welfare to an aboriginal culture. Concerning the topic of endangered languages and the Internet, there already exist effort for providing an indigenous nation with a space for projecting such cultural asset. This document now introduces some case studies concerning language preservation and its use on the Internet.

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[12] During the summer of 2001, I was told the case of an ambitious educational project in the Mexican state in Chihuahua: computers were taken to every municipality of the state. It proved successful in big cities and towns, but in isolated communities, such as the Rarámuri in the Copper Canyon region, it proved useless, provided that most communities do not have electricity.

[13] Cavallo's "indigenous knowledge" approach [Cavallo, 2000] is a good example on how an indigenous community can learn new skills by themselves, and thus find solutions to technology problems using available means. Such approach is widely inspired by Papert's constructivist learning approach [Papert, 1980].

## 2.3 Minority Languages on the Internet: some case studies

This section presents three approaches in which aboriginal languages are being preserved using online resources. The three cases presented enclose three different paths in which minority communities have developed a presence on the cyberspace; for instance: (1) sites in which deep information is provided on the indigenous nation, but with little information in a native language, such as the Oneida Net; (2) sites in which there is information in a native language, but still lack of an accurate, unified vision about the indigenous nation, such as the Sami Net and the Sami presence on the web; and (3) sites in which have equal presence in a majority and a minority language, which additionally engage the user in active collaboration and feedback, such as the "Inuktitut living dictionary" initiative, carried out by Nunavut and the Inuit people in Arctic Canada.

### 2.3.1 Oneida Net

Native Americans have been perceived as a minority society branded by endless stereotypes, sometimes regarding them as underdeveloped societies. But Native Americans have gained more and more spaces on the Internet, as a way to opening to the rest of the world, and sharing their heritage, especially to those who still regard them as "inferior" or "outdated". Moreover, members belonging to the tribal nations write the content of the websites, especially devoted to topics such as language preservation, history, folk traditions and current affairs [Buszard-Welcher, 1999]. Some tribes have even contributed to the development of fonts for their languages to be typed in the computer such as Cherokee, Cree, Hawaiian [see Donaghy, 1998] and Inuktitut [Cain, 2000].

A major representative of a Native American website is the one run by the Oneida Indian Nation in New York (http://oneida-nation.net) [Polly, 1998]. It could be defined as a top quality website, conceived by computer experts, but with content that is conceived by the tribal members. It is surprising to know that they also possess an "Internet Services Department" which

> [provides] a full range of services, related to the Internet, to various departments throughout our organization, from Internet connectivity to the construction and maintenance of full scale websites (taken from http://oneida-nation.net/internetservices/).

As seen in Figure 2-4, there are several sections of the website that can be separated for analysis purposes. Most of the web page is devoted to the Oneidas themselves: who are they, the explanation of their symbols, their tribal

organization and institutions, and their traditions and customs. Even they portray with pride their participation during crucial times for the United States such as the Revolution War and the War of 1812.

Another important section is related to the land claims, which clearly provides evidence of the limits of the tribal nation, as well as updating people of the progress of such issues (for instance, notice of construction on tribal lands). Such section demonstrate a great connection between the members of the community, as well as using the Internet for showing evidence of such particular issues as the delimitation of their territories.


**Figure 2-4:** Home page of the Oneida Indian Nation on the Internet. Notice the English content of the website.

Also, the Oneida website offers other links, such as a "news and events" section, an employment section, a section dedicated to the economic ventures on the region (including the Indian Nation owned casino), as well as links to departments. One of its most recent ventures is the creation of a media

corporation, Four Directions Media, including "the first production company owned, operated and funded by Native Americans" (see http://skydancer.tv).

At a first glance, it is a very impressive website that demonstrates how far does a Native American group can go. However, navigating on the website it seems that something is missing: are there any links to content in Oneida language? In fact, the site contains a few links to the Oneida language. First, there are audio files containing Oneida names for animals, as well as the name of the Nation in Oneida. Second, there is a page devoted to the oral tradition of the Nation, which includes a brief explanation of the Oneida language. It is interesting to find some quotes that describe the struggle of the Oneida language to survive.

> Nineteenth-century Oneidas began to write down their language using the English alphabet. Often the first texts they transcribed were hymns. They used the music from popular Christian hymns but frequently wrote new verses in Oneida.
>
> The Oneida language appeared to be dying out by the mid-twentieth century. Schools, even reservation schools, forced children to speak English and often punished them for speaking in their own language. Many parents encouraged their children to speak only English, believing it would help them succeed economically. A few native speakers fought to keep Oneida alive, others struggled to learn the language as adults. Now, the Nation offers language classes and the language is beginning to flourish again (taken from http://oneida-nation.net/orallanguage.html).

In summary, while the page is a good example of content managed by the community, it still reflect the assimilation of the Nation to the American society in terms of being an All-English website. Probably this can be explained given its target audience (especially people who are potential visitors to the Indian Nation). But if the target audience also comprises the same members of the Oneida Nation, why don't they start developing content in their own language?[14]

### 2.3.2 The Sami and the Internet

The Sami[15], commonly known as Lapps, are part of the indigenous population inhabiting the northernmost part of Scandinavia in Europe, as well as the Kola Peninsula in Russia. While the number of Sami comprises some 100,000

[14] While this is true for the oral form, it depends whether the Oneida have developed a written standard for their language. [Gándara, personal communication].

[15] For the scope of this work the word 'Sami' (pronounced SAH-meeh) will be utilized; however, the term is usually written in different ways, among them 'Sámi', 'Sápmi', 'Saami', 'Saemieh', 'Same'.

inhabitants, there are approximately 25,000 to 35,000 speakers, which communicate in ten different, but related, Sami languages [Magga and Skutnabb-Kangas, 2001]. The Sami are usually known by their reindeer husbandry; however, this indigenous group has been adapting new technologies for their routinely activities. In recent years, reindeer herders started using technology innovations such as snowmobiles, all-terrain vehicles and cellular phones for facilitating their herding activity [Forsgren, 1998: 34]. Internet is not an exception; introduced some five years ago, it recently started to penetrate in their traditional culture. For instance, prior to the election of the Sami Parliament, "several political parties advertised their platforms on websites" [op. cit.: 34].

Despite their important presence and recognition within the nations they comprise (Norway, Sweden Finland and Russia), the Sami people have had suffered from discrimination and segregation practices from the national government, as well as a cultural shift, during the last century. For instance, in Sweden, prior to the formation of the Sami Parliament, the government called 'Sami' to those who were involved just in the reindeer husbandry activity (which consequently originated the 'Lapp' denomination to this ethnic group, as they are commonly named), thus creating "internal conflicts within the Sami nation that continue today" [op. cit.: 35]. Such conflicts have even permeated into the cyberspace, where non-Samis maintaining Sami-related websites usually post wrong or incorrect statements about the culture and history of the minority group.

It is in recent years that a reverse language shift phenomenon has happened in the region, with the revalorization of the Sami culture, and the introduction of compulsory education in Sami language in elementary school, as well as some courses in the university level [Huss and Lindgren, 1999]. Currently, six of the ten languages have already a writing standard for their language [Magga and Skutnabb-Kangas, 2001: 26], while the other Sami variations are catalogued as endangered, existing just a few speakers of such dialects [Forsgren, 1998, 36]. Extending this fact to the cyberspace field, those Sami languages that have a writing standard have been aided by the development of a special type font for correctly displaying Sami characters (based on Latin characters, except for Skolt and Kildin Sami, which use a modified Cyrillic alphabet, which also can be encoded [op. cit., 1998: 36]). To this revitalization of the language, it is also worth mentioning that they already have presence in traditional media, such as newspapers, radio and television. In fact, some of Sami-encoded publications can be found on the Internet.[16]

[16] One of the several catalogs of websites managed in Sami (including online newspapers and other mass media) can be found in http://www.yle.fi/samiradio/samilink.htm. This list is in Finnish, however, the same page is written in Sami, with Sami characters (some of them can't be displayed correctly with the default Western European encoding). Some links are documented in other Scandinavian languages as well (including some documents in English).

Another issue is that despite the creation of new websites managed by Sami people, access is not universal. It is reported that only certain Sami groups take charge of the content, and that the majority of the population still does not have access to technology for creating web content and writing e-mails. Therefore, a number of initiatives for developing online content by and for Sami people have currently in development. One of them is SameNet (http://www.same.net), which is an initiative of a Sami organization in Sweden for introducing education in Internet technology. Most of the participants involved in the project are members of native communities. It uses a BBS-type based platform (actually a proprietary software platform called 'First-Class', developed by Centrinity, http://www.softarc.com) in which the participants are granted with a username and a password, so they can have communication mechanisms such as e-mail and discussion lists. Figure 2-5 displays the environment used in the website.

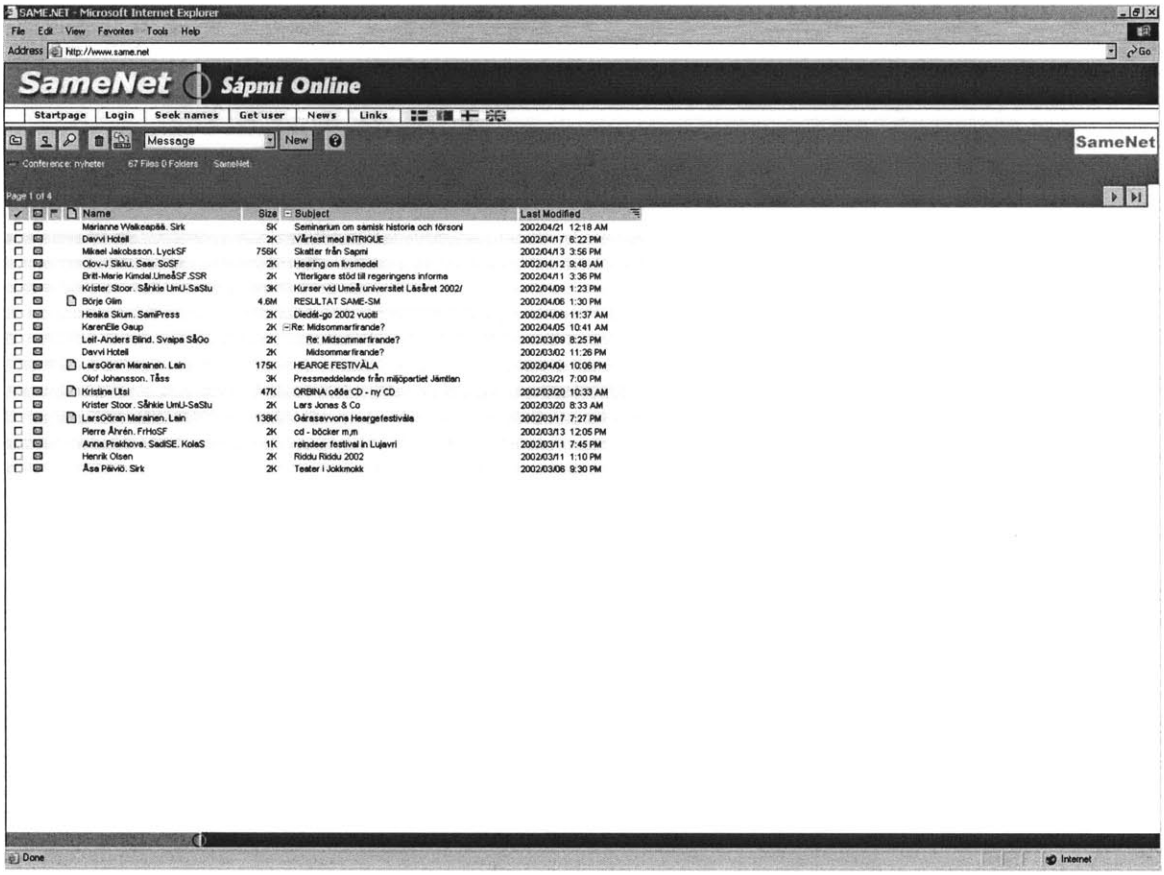


**Figure 2-5:** A page of SameNet, based in Sweden. It uses First-Class® as a platform for building a discussion list type of environment. Notes are usually posted in Swedish, Finnish, and sometimes in Sami language.

This solution enables collaborative participation within a group, since access to the system is based on a user-password logistics, with the addition of extended security measures such as message encryption and PGP [Forsgren, 1998: 35]. Such platform permits that only registered users can post their collaborations online.

The environment can be described as an open forum in which some of the messages can be seen in Sami, as well as other mainstream languages such as Swedish or Finnish. This demonstrates that reverse language shift of the Sami is still a work in progress, and given that they have already gained spaces in a national process, majority languages are still used as a 'lingua franca' among this minority group.

### 2.3.3 The Living Dictionary of the Inuit

The Inuit nation, mistakenly referred as 'Eskimo', is the most important ethnic group located on the Arctic region of the American continent. They inhabit much of northern Canada, Alaska as well as Greenland. In Canada, where they have gained more recognition, they have accomplished the creation of Nunavut, the third Canadian territory. Nunavut ('our land' in Inuktitut, the Inuit language) is conformed by half of the already existing Northwestern Territories. This is the first territory in Canada to have three official languages: Inuktitut, English and French. Though most of the paperwork and government affairs are still conducted in English, efforts are made to progressively introduce the Inuit language in all the activities of the territory. For instance, there is a pilot project for teaching Inuktitut to arriving government employees, as a stimulus of introducing the native language in current government affairs [Rideout, 2002]. In addition, there are several bilingual newspapers, in Inuktitut as well as in English, and mass media is beginning to gain spaces in Nunavut.

Contrary to the Oneidas and the Sami, which mostly concentrate in smaller territories, Nunavut is a land with harsh conditions: despite its 2 million square km (as big as Mexico), most of the territory is unpopulated (the actual population is 28,000, of which 85% is Inuit [Government of Nunavut, 2000]). Consequently, most of the communities are spread across this immense territory, resulting in a variety of dialects of Inuktitut. Without a question, communication between those isolated communities is a crucial point for maintaining the unity of the territory. How to achieve a consolidation of the different Inuit language dialects provided the distance obstacles?

One of such initiatives consisted in the connection of all the communities of the Northwestern Territories and Nunavut to the Internet, as well as developing specialized products in Inuit language. While there are critics of such initiative, it

seems that Nunavut currently has already an important presence on cyberspace. There are diversified websites based on this territory, covering several aspects ranking from government to tourism, as well as several newspapers of the territory. The Canadian Broadcasting Corporation even created a news web cast in Inuktitut that can be seen online [Zellen, 1998].

While developing the connectivity idea, a problem arose: how to encode Inuktitut into the computer? While the Inuit language can be written using the Latin alphabet, Inuktitut is one of the several languages that use a non-Latin syllabary, provided the nature of its sounds, as well as being an agglutinant language as in German [Cain, 2000: 37]. The referred syllabary is an adaptation of the Ojibwe syllabary, developed by James Evans, a missionary who conceived this writing system for the referred Indian Nation located in central North America. This syllabary was adapted in 1976 by the Inuit people living in northern Quebec, and later taught in Inuit schools in the Arctic Regions, becoming the preferred writing system for Inuktitut.

One of the advantages of the Evans syllabary and its variations (which is in part based on Pitman shorthand) is that it is used in several Indian Nations across North America, including the Cree and the Blackfoot. As a consequence, there was the possibility of developing a type font that would not just benefit the Inuit, but also to some of the most important ethnic groups in Canada. This new font, called 'Unified Canadian Aboriginal Syllabics'[17] is now a supported Unicode standard. More notable is that there exists an Inuit keyboard layout, and that even Microsoft's Internet Explorer supports a 'CanSyllabic' script on its browser [Cain, 2000: 38].

With the language-encoding problem solved, researchers could dedicate to examine a way to conceive an online dictionary, in which Nunavut's inhabitants would enrich given the existing 17 dialects. Therefore a distributed database approach was developed, using the common user-password approach, but with the participation of linguists, members of the government and web developers. As documented in [Meloan, 2002], the software solution was conceived using Java components, as well as XML and a relational database. In addition, similar "living dictionaries" can be developed in any aboriginal language that uses the Evans syllabary.

As seen in Figure 2-6, the interface of the dictionary presents certain elements: (1) a language selection bar, which enables the user to look up for terms in English, French or Inuktitut, whether in Latin or Syllabary form; (2) a keyboard interface in which the user can enter the query using the Evans syllabary; and (3)

[17] Such Unicode standard is described in a document available on the following Internet address: http://www.unicode.org/charts/PDF/U1400.pdf.

the mentioned user-password interface: a registered user can enter a term in a certain dialect, or enrich an approximate translation for a word or idea. Additionally, by clicking in a word, the interface also displays the definition of a given term, and the corresponding translations into English and French.

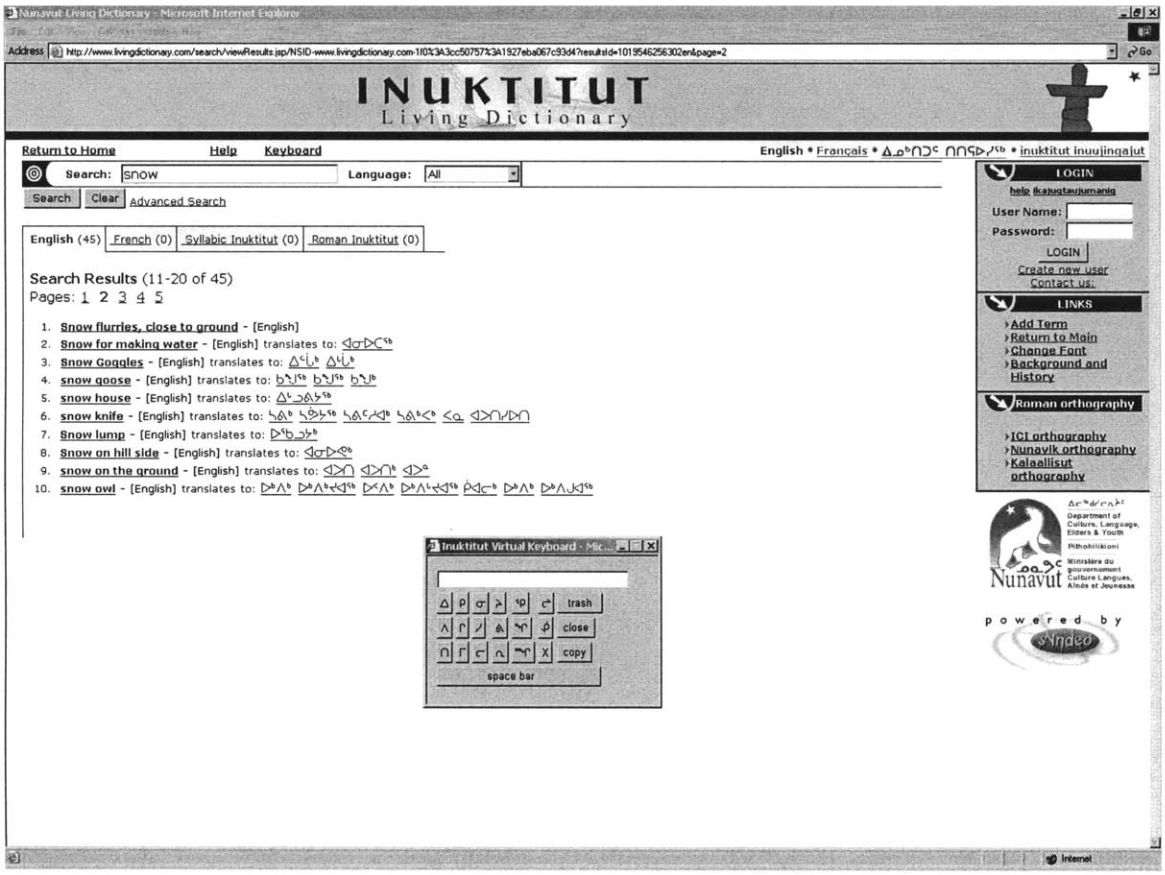


**Figure 2-6:** A page of the Living Dictionary project. Several results can be presented in the query, provided that there are different dialects of the Inuit language. Notice the Canadian Aboriginal Syllabics encoding, as well as the 'Inuit keyboard' available for queries using the syllabary.

In conclusion, the Living Dictionary project has demonstrated to be a form of active community participation on the enrichment and documentation of the Inuit language, engaging native speakers, language specialists and government instances to create an updated database of Inuktitut terms in every possible field, with special regard to the current dialects of the language. But it should be noticed that the Inuit language has been empowered since the creation of Nunavut: a process that took decades to consummate and gaining a space in a national context, as well as development of technological solution which have lead to the creation of computer support of the language, as well as its further

standard recognition. In addition, it should be kept in mind that English and French, Canada's national and official languages, still influence the Inuit nation in several aspects, especially in the cultural issues.

It is interesting to note that there are least two simultaneous processes happening here: on one side, a reversal-language shift, but on the other, a divergence process, since there is not just one language. The unification of the language, if ever desired or necessary, will entail the loss of some variants. A dictionary may help preserve such variability, but typically where a sense of "nation" predominates, one of the variants is selected to be the "national" language.

## 2.4 Summary

This chapter introduced the theoretical aspects on minority cultures as integrating parts of a country, as well as its implications on the constant loss of the native language. It also explained the reversal language shift perspective on recovering the domain of the minority languages, and its reintegration and recognition in the national context. In a final stage, three case studies were presented, dealing with perspectives on how technological advances can influence traditional culture, on positive as well as negative aspects.

On one side, more spaces on the Internet are open to indigenous cultures, as computers and connectivity become widely available. The ideas and opinions of other cultures become more available to any user who enters the cyberspace. On the other hand, the websites reflect in some cases the integration of minorities into other society, expressed by the content of the website, or in the language used.

It is also noticeable how Internet creates a new communication space for cultures that are historically isolated to the Western civilization, and in some instances, they have won their territory, in terms of mass media or law reforms in their countries.

Nonetheless, the presented cases have something in common: all of them are initiatives located in developed countries, which have the sufficient infrastructure and resources to finance such ambitious ventures. Developing nations still lack infrastructure to provide connectivity to isolated communities. In addition, politics of integration and cultural shift (sometimes product of colonization) still prevail, thus continuing the assimilation process.

This can be seen as an opportunity for empowering cultures and the heritage of minority groups, to provide the necessary tools for making their voice be heard.

What kind of approach can be used for achieving such task? This work proposes 'active community publishing' as a solution for engaging people in the creation of material (oral, written or multimedia), in which a native nation can share their beliefs and cultural assets with people. It is usually said that a better knowledge generates a better understanding; therefore, who can provide better knowledge of a culture? The people of that culture themselves. In the following chapter, 'active community publishing' will be described. In addition, this document will present the software that could achieve the proposed goal, and simultaneously introduce the proposed technology that will be tested for the development of the framework.

# Chapter 3. Active Community Publishing

The so-called 'cyberspace', a virtual space residing in computer networks, has evolved into a new, borderless community in which anyone can become a citizen. The Internet has become a new social network, provided its high rate of interactivity, as well as its potential of knowing the people behind this multimedia environment [Wellman, 1999]. The influence of this kind of computer-mediated networks in our daily lives is clearly noticeable: they can either reinforce existing physical connections, or they are auxiliary in the creation of entirely new communities. Such 'virtual communities', consequently, provide new ways of social interaction and provide a tool for revaluating the perception of one's 'identity', either in a personal of in a community scope [Turkle 1995; Warschauer, 2000].

The challenge can be summarized in a very simple question: how to develop mechanisms in which Internet technology can reinforce place-based, face-to-face interactions rather that supplant them? Would such mechanisms permit the endurance of existing social networks? [Putnam, 2000]. There have been opposing positions on the role of Internet as a new social interaction builder. While some researchers conclude that the cyberspace and its navigational environment tends to be a substitute of face-to-face encounters, and thus confine an individual in his very own personal space [Kraut et al., 1998; Nie and Erbring, 2000], others conclude that computer-mediated communication enhances social interaction, and even creates strong ties within a neighborhood, challenging the idea of an individualistic, suburban environment where no one knows the next-door neighbor [Wellman and Gulia, 1999; Hampton, 2001; Pinkett, 2001].

If the Internet is another environment in which human interaction is possible, who can enter such space? Moreover, who can post information on the Internet? In some way, the Internet can also be perceived as an elite environment, in which those involved with computer knowledge, or those who have formal training in computer skills, journalist-level writing or other language-related abilities, are the only people granted with access this virtual world [Warschauer, 2000]. Under this proposal, sectors of population such as senior citizens, children or communities located in isolated zones cannot belong to an online community. But thanks to the constant introduction of computer technology in schools, at work or at home, more and more people get involved in this virtual community, collaborating with ideas, communicating with others, looking for and retrieving information of any kind.

Emphasizing this constant influx of computer technology in our lives, an extension to the issue proposed by Putnam could be summarized in the following

question: how to create **interactive**, **participatory** environments in which Internet technology reinforces such interactions? As a plus, it is possible to introduce a **feedback** mechanism in such environment? It is evident that the cyberspace is not just a passive medium in which people just browse documents and web pages looking for information. Nowadays, novel communication paradigms have permitted people to in some way interact in this information space; discussion lists, e-mails or web logs are communication channels in which anyone can manifest their very own ideas, or share with others their personal knowledge on a certain domain. But there should be other methodologies that reinforce the sense of **community** in a constructivist way [Papert, 1980], in which participants submit their collaborations in an **active** and constant way, besides receiving feedback from that submission, not only from the members of the community, but also from outside members who would like to share their points of view. The described scenario is what is labeled as '**active community publishing**': a process in which a community creates an online environment, which reflects the values of the community, and enables the possibility of receiving feedback on such environment.

This section examines the paradigm of active community publishing, which will be the selected approach for the development of a language-based utility. First, the Silver Stringers project is described. The Silver Stringers project is an initiative of the MIT Media Laboratory to create online publications maintained by members of a community, for instance, senior citizens in a suburban area or teenagers spread across the world. Next, two versions of the used software are described: the already used 'Pluto' and the new 'HDL'. Such programs were conceived to manage and operate an online publication, in a similar way that people would manage a 'real' publication, such as a newspaper. As a final point, the chapter analyses ways in which active community publishing could prove efficient for the revitalization of a minority language.

## 3.1 The Silver Stringers project

The Silver Stringers project [Driscoll et al., 1997; Smith et al., 2000; Turpeinen, 2000], initiated by the MIT Media Laboratory, could be defined as "a community-centric approach to news coverage and presentation intended to train and equip its members to be reporters, photographers, illustrators, editors, and designers of a localized Web-based publication" (taken from http://stringers.media.mit.edu).

The origin of the name 'Silver Stringers' reflects the demographic group that the project was originally aimed at: senior citizens. Usually such demographic sector is regarded as the group that encloses the most wisdom and experiences of humankind. Besides being characterized by their accumulated knowledge over the years, they are also distinguished by their deep understanding of the

community dynamics, as well as possession of a deep-rooted connection to the places where they have lived and worked. Proof of this resides on the role of elder people as governors, priests and high-rank officials in many of the ancient civilizations in the globe, as well as many ethnic groups in the present century. However, in an industrialized era, elder people are usually regarded as a group that already performed its duties on society, characterized with fixed, unmovable ideas that cannot be altered by the younger generations.

The Silver Stringers project challenges such prejudices, by allowing seniors to manage and produce an online publication. This project also permits to analyze how senior citizens make use of narrative and images to share their own personal experiences and how they interweave in the history of the community. Not only does the project involve the learning of new skills, but also provides an opportunity to analyze the attitude of older adults toward computer technology, and probably how they overcome social isolation and become again active members of their communities.

Form the definition taken from the project website, two components make up the human factor in the initiative: an active set of users that collaborates on the information process, and a sense of community that is the base for the web-based solution, in this case an online publication. A brief analysis of both components is introduced in the following subsections.

### 3.1.1 Journalism as a method of understanding information

The first motivation for launching the Silver Stringers project resides on looking into an alternate approach that engages the active role of the general public to make sense of information, as well as improving the quality of the public discourse. Smith et al. [2000] provide a brief explanation of this point:

> The increase in information flow provides many new opportunities for individuals to become better informed about the world. However, this also means that consumers must become more selective, more critical, about what they see on their televisions, computer screens, and so on [...] As the growth in information continues to explode, **individuals will have to become more critical of their sources**; they will have to engage in a form of media criticism that is rarely seen today. [op. cit.: 730, emphasis added].

As a result of this critical process, combined with the active role of the once 'media consumer', the project sees "journalism as a model for thinking and creating". In other words,

> Being a journalist means thinking critically about the world in order to present it to others. Moreover, it means receiving critique and feedback from other journalists (and the public) about what makes a useful body of information [op. cit.: 730].

Therefore, members involved in this journalistic activity should assume a set of responsibilities, which include submitting the necessary data for creating the publication (in the form of articles, photographs, audio or even video segments), as well as establishing their own methodologies for revising, designing and managing their online publication. In addition, the approach does not assume that a specialized person is the one indicated for assuming a position; "all members of the community have stories to share, and their voices can be heard if they are given appropriate tools for expression" [op. cit.: 731]. The problem is reduced to who wants to share such ideas, or who is willing to collect and document such personal perspectives of their daily environment.

### 3.1.2 The definition of community

The second component of the human factor focuses on the sense of community. Widely defined in social sciences, it is necessary to examine the definition of this term, which is not just applicable to the Silver Stringers project approach, but it is extensible to social interactions, including the methodology proposed on this thesis. For instance, Wellman [1999] concludes that because social networks are also present on the Internet, the concept of community is also applicable in the Internet. Additionally, Marc Smith's analysis of Usenet [1999] also provides sufficient evidence the action of posting ideas on a certain topic in such forums, as well as creating interactions between online discussion lists; therefore, the concept of 'online communities' is also applicable.

But those domains can be considered as communities? In fact, what is a community?

Sarason [1974] describes three main properties of a community, which usually correspond to sets of people physically close, for instance: (1) a perception of similarity among members of a group; (2) an acknowledgement of interdependence among the same members; and (3) and a generalized feeling of belonging to a larger structure.

On the other side, McMillan and Chavis [1986] emphasize four main characteristics of a community: (1) membership or a sense of belonging; (2) influence, or the recognition that a group exists; (3) fulfillment, or the feeling of rewarding among members of the group; and (4) emotional connection, which

can be expressed a shared history of common events. Such four characteristics were later relabeled as spirit, trust, trade and art [McMillan, 1996].

The presented characteristics, together with the fact that a community does not necessarily imply a physical or geographical space (according to McMillan's definition), provide guidelines to create a community in an online scenario, as well as support and enrich social interaction in such novel environment. Applying such paradigm to the Silver Stringers proposal, an ideal scenario can be suggested. In such scenario members of the community would engage in the community because they possess a feeling of belonging to a group, contributing with their deliverables. When the deadlines are met, and the proposed objectives are achieved, such progress triggers a sense of security and emotional safety, as well as reliance among the members of such community. And by defining the rules of the game, choosing a topic or an insight article, and providing the opportunity to everyone to get engaged in the roles of this journalistic community, there would be an opportunity to explore some sort of shared history, expressed as stories, articles, photographs, that is, in some sort of 'artistic' form.

In conclusion, the members of the project are the sole responsible people for defining themselves and to be recognized as a community, regardless the physical or geographical restrictions that may exist. Such group of people is also in charge of maintaining this sense of community among its members, as long as it is necessary, either in a month or throughout generations.

Having defined the sense of community for the scope of the Silver Stringers project, the most representative examples of this project are introduced.

### 3.1.3 Case studies of online communities under the Silver Stringers approach

The first Silver Stingers website was launched in 1996, in the city of Melrose, Massachusetts[18]. The initial volunteers of the project were senior citizens based at the Milano Senior Center in the mentioned locality. During the initial stage, most of the volunteers who participated have little or no knowledge on computer technology, and those who had some experience did not know anything about the Internet. Hence, the training approach had to be planned carefully, and the collaborative software was designed to upload the submissions to the Internet in an automated way[19]. Nowadays, the 'original' Silver Stringers publish an online newspaper, the Melrose Mirror (http://toy-story.media.mit.edu:9000, shown in

[18] Melrose is actually a suburb of Boston, Massachusetts. Other Silver Stringers publications were based in other two Bostonian suburbs, Danvers and Revere.
[19] The collaborative software used by the project will be analyzed in the next section.

Figure 3-1), which is renewed on a monthly basis. The organizational meetings of the newspaper collaborators have become a weekly activity in the Senior Center, in which the editorial committee revises the submitted articles. Most of the original members of the project still participate on the publication, and new volunteers join this activity every year. A seasoned journalist advises them on writing supports them during the editorial process, and a technical staff solves issues related with the software, when they cannot find a solution.


**Figure 3-1:** The front page of The Melrose Mirror, the online publication run by senior citizens in Melrose, Massachusetts. Notice the particular sections of the publication, emphasizing the local scope of the publication ('Melrose Centennial'), sharing personal experiences of the collaborators ('Travel' 'Food/Recipes'), as well as issues concerning senior citizens ('Saving $$$$$ in Retirement!' [sic]).

The progress of the project is noteworthy, because those volunteers, who initially lacked of any knowledge of computer skills, currently are proficient with such tool. Some of them even ventured to learn HTML as well as digital photography. Additionally, they have given support to other online publication initiatives, such

as the Danvers Oracle, based at Danvers, Massachusetts (http://danversoracle.media.mit.edu:4000); and the Information Age Town project in Ennis, Ireland (http://www.ennis.ie). Recently, a milestone was set by one of its members, age 89, who has recently published a book relating some of his personal experiences during the Great Depression in the 1930s. Most of the book passages contain extracts of articles previously edited on the Melrose Mirror.

It is evident that The Melrose Mirror made a difference in the life of senior citizens, but reinforced as well, the sense of community among the people who sometime of their lives belonged to Melrose. The stringers have received mails from places as far as Florida or California (where actually two former Melrose residents participate remotely in the publication [Smith et al., 2000: 736]). The stringers themselves have felt that an online publication provoked some change in them, and they consider their work as something serious.

Having demonstrated the success attained with the senior citizens group, it was time to test the active community publishing approach with other different audience. In 1998, a new opportunity arouse when the Media Lab hosted the 'Junior Summit', a forum in which Children and teenagers from around the world shared their ideas on global topics such as technology, environment and economic and social development, as well as brainstorming on how technology can help solve issues derived from those topics. After the end of the event, it was agreed that the former participants should have a forum in which children would discuss problems in their communities or countries, as well as providing some background on their culture and their daily life. By the end of 1998, the first issue of 'The Junior Journal' (http://journal.jrsummit.net, shown in Figure 3-2) was launched, and currently it comprises collaborators from around 60 countries around the world.

Being also a monthly publication, the Junior Journal proposed new challenges for the Silver Stringers project. Now all the collaborators were not concentrated in a defined location, but they are spread over diverse geographical areas in the world. The administrative and editorial processes show differences from the Melrose Mirror as well. As a first point, all participants (editorial as well as writing staff) are children and teenagers between the ages of ten and eighteen. When a participant 'officially' becomes an adult (that is, turns 18), the participation in the Journal staff is concluded, but former participants usually keep in touch with the remaining members. If a child wants to join the Journal staff, he or she must submit sufficient evidence that he or she is in fact a child[20]. However, adult staff

[20] The rules for accepting a new participant were defined by the original members of the Journal, as a method for avoiding adults to collaborate in the newspaper. This was done for avoiding biased commentaries, especially on certain comments, which can jeopardize the original purpose

members usually provide help when the writers need feedback on the content of the articles or need technical assistance with the software.

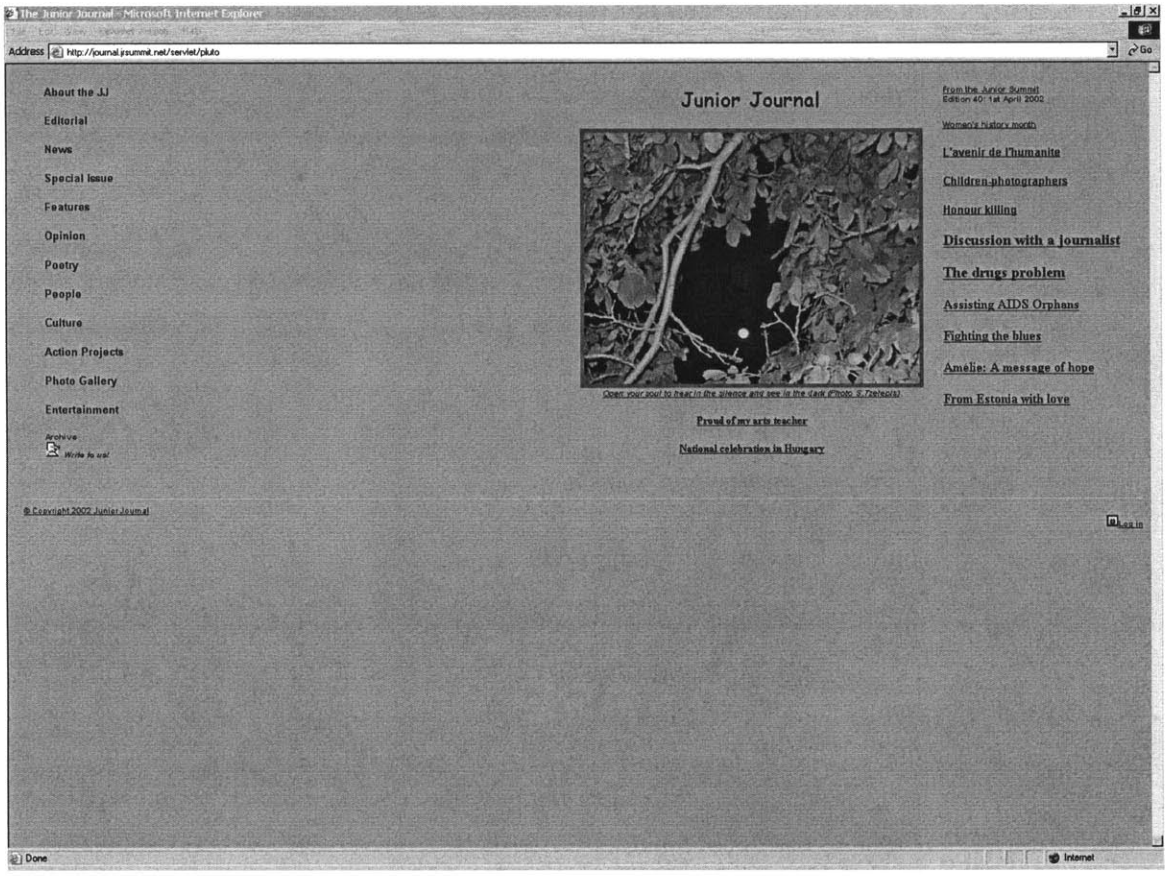


**Figure 3-2:** The front page of The Junior Journal, run by teenagers coming from several places around the world. Daily life issues, as well as current topics are discussed on the website. Recently, some of the articles have been submitted in other languages, such as French or Spanish.

On the administrative side, there is an "edition editor", a position that rotates monthly among the fifteen original members of the journal, so everyone can get equal opportunities on collaborative in several positions within the publication. The administrative 'meetings' are conducted by constant exchange of e-mail messages among the members of the Journal.

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of the newspaper. Even when oneself declares as a child (and given the impersonal characteristic of the Internet), the staff clearly notice whether a story was submitted by a child or not.

Over the last years, the Junior Journal has been notable because of its constant evolution, by dealing with important topics that are commonly regarded as 'adult issues': pollution in rivers and cities, human rights violations, international conflicts such as Kashmir or the Middle East, poverty and drug trafficking are some of the articles that the Journal staff have presented in the last issues. Such content is a clear indicator that the opinion of a child is also important when dealing with issues that affect directly to their lives as well as their communities.

In summary, both The Melrose Mirror and The Junior Journal are examples on how journalism and active publication contribute to reaffirm the sense of community and belonging among its members. It also corroborates the original idea of using critical writing for analyzing current issues affecting their communities, in both elder people and children groups. On the other hand, the sense of participation and belonging, constant enhancement of the content of the online publication, as well as appropriation of the publication as part of their lives clearly define both The Melrose Mirror and the Junior Journal as communities by themselves, therefore proving McMillan definition, and the original objective of the Silver Stringers project as well.

## 3.2 Collaborative Software for Community Publishing

### 3.2.1 Pluto: the Silver Stingers software

What is the core component that allowed The Melrose Mirror and the Junior Journal to function adequately? One of the core elements of the Silver Stringers project consists of the technology approach for being tested in the environments described in the last section. Both The Melrose Mirror and the Junior Journal use Pluto, a collaborative software developed by Dennis Quan and Ingeborg Endter[21] at the MIT Media Laboratory. Pluto was created for a main reason,

> As the Silver Stringer project started in 1996, it became clear that **there were not ready-made systems available that would have been suitable for small-group Web publishing**, so we decided to make a tool ourselves. [Turpeinen, 2000: 30, emphasis added].

The Silver Stringers participants in the past three years have been successfully using Pluto. Such software enables the creation of a Web server in a computer, as well as building a collaborative structure in which members can write their articles, as well as publish them on the Internet.

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[21] Implementation details of Pluto are omitted in this dissertation; however, a thorough description of the Pluto software can be found in [Smith et al., 2000; Quan, 2002]. This section will just highlight some of the most important characteristics of the software.

A clear advantage of Pluto over other web publishing tools is that the program can be installed as a service or as an agent. Having such capability, there is no need of running an executable for activating the program; the software is accessed using a web browser. If the Pluto server (the computer in which the Web server, and thus, the online publication environment is installer) has an assigned IP address or a DNS, the collaborator can access the server from virtually any computer connected to the Internet.

In addition, Pluto uses an 'editorial process' approach for publishing articles on the Web, rather than a more direct, 'publish what you have' approach usually followed by other web-building environments. The editorial process programmed in the software differs in several aspects with traditional publishing. In the traditional approach, sections as well as format are already predefined, and there is usually a deadline for submitting the articles and other materials before the printing process starts. On the contrary, the proposed software converts the online publication into a customizable website which can be modified depending on the objectives and the needs of the editorial committee. Sections can be added, modified or deleted; in addition, an article can be either uploaded into the publication as soon as it is received (even if the deadline has already occurred), or it can be put in hold for the next major revision, possibly as part of a new section.

Still, the editorial process conserves other elements of traditional publishing, especially the information collecting process – collecting material through interviews or extensive research, photography, proofreading and correction of articles. An analogy between the 'real' editorial process and the software algorithm can help to explain the 'editorial process' approach (also schematized in Figure 3-3).

1. A collaborator submits an article to the editor, together with another media item, usually a photograph.
2. The editor revises the content of the submitted article, and returns the article to the collaborator, pointing out grammar or style corrections to be applied.
3. Such interchange of articles continues until the editor finally accepts the article.
4. The editorial committee (which can be defined as a board of editors responsible for the content of the publication) comments the articles submitted, and place them in the corresponding sections already defined.
5. The online publication is launched, according to the time interval set by the editors.
6. When it is time to renew the publication, the articles are usually sent to the archives.

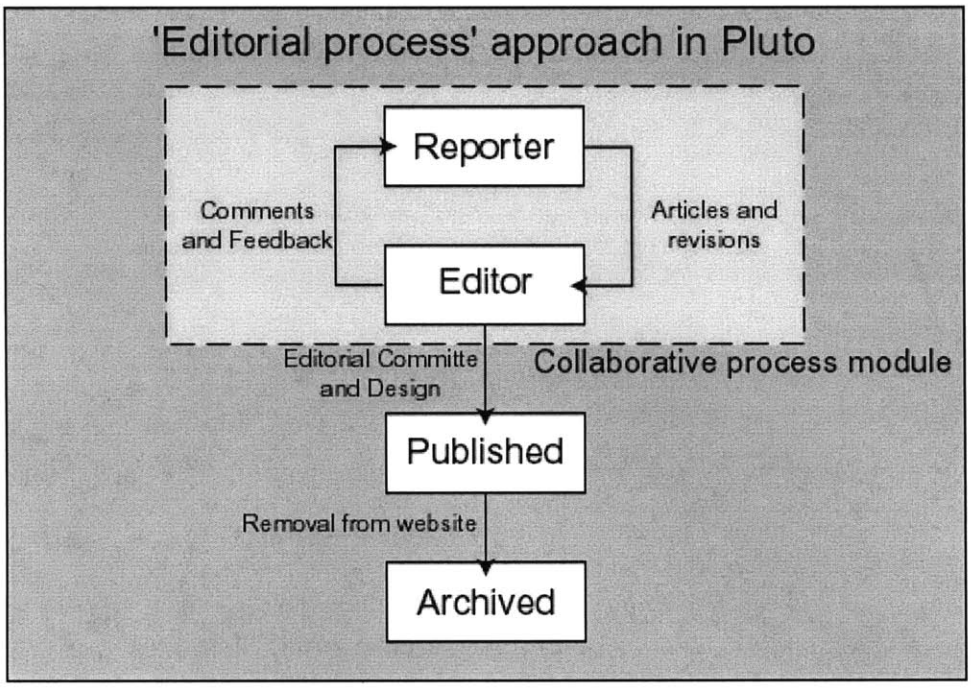


**Figure 3-3:** The editorial process approach used for Pluto. Parts of this process were enhanced during the development of HDL, an upgraded version of the Pluto software.

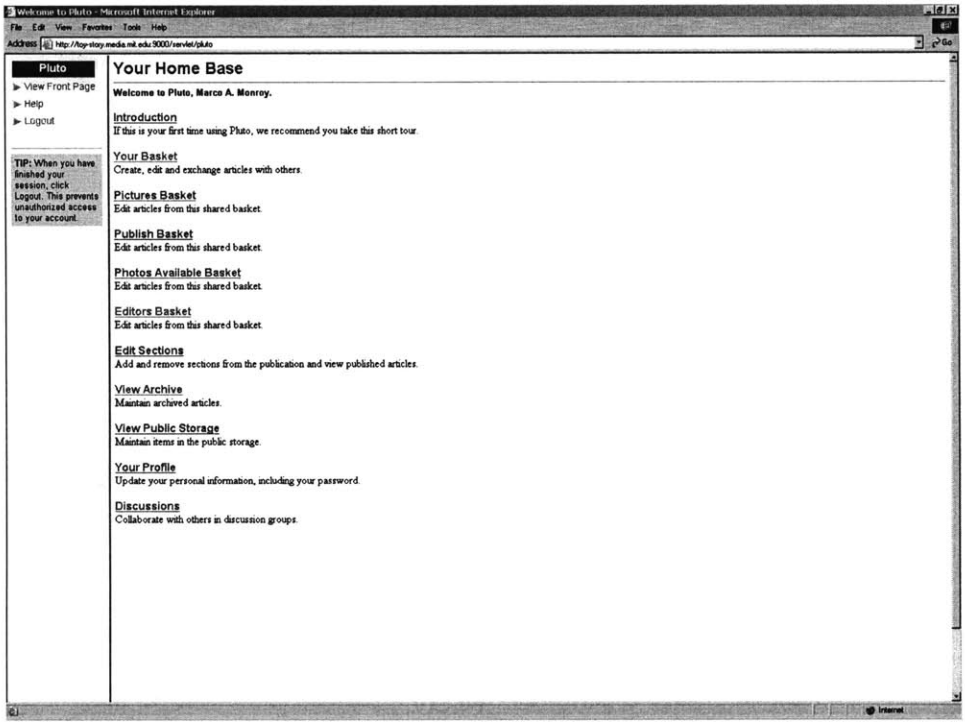


**Figure 3-4:** Main screen of the Pluto environment. Depending on the user permissions, the software will display the corresponding functions.

Such methodology has been coded into Pluto, so its use will resemble the editorial process mentioned earlier. As a first step, all the collaborators of the publication are assigned roles, and therefore, have permissions on which part of the newspaper can access. Pluto defines three basic types of collaborator: a 'writer' that submits the articles as well as the photographs; an 'editor' that provides feedback to the writer in terms of possible corrections, as well as sending the articles to be published; and an 'administrator' who usually does maintenance activities to the publication, such as the creation of templates (the appearance of the online publication), or changing permissions to a user.

The security mechanism in Pluto is based in a simple user-password scheme. Such scheme allows the collaborator to enter the main screen of the program, which is displayed in Figure 3-4. The program displays a set of functions that the user can execute, depending on the permissions assigned to the referred user. For instance, a user that is defined as a 'writer' cannot see the 'Editors basket' or the 'Administrative tasks' functions.

Considering the 'editorial process' approach, Pluto uses a 'basket' paradigm to pass articles between writers and editors, and from editors to a 'publishing press'. For instance, there are personal baskets ("your basket") in which collaborators write their articles, and deposit their own digital pictures[22]. There is also an 'Editors basket' in which the editors received all the submitted articles, so they can proofread and comment on the submissions. Finally, there is a 'Publish basket' in which all the accepted articles are ready to be uploaded in the online publication. The process, therefore, is easy to visualize; it is similar to have mailboxes or other storage item in which all the collaborators can deposit the articles, which implies that the collaborator can be not present at the time of receiving an article. In other words, Pluto allows an asynchronous method of transmitting the articles, assuring that the article is always inside a 'basket'.

Figure 3-5 displays the personal basket of a collaborator. Several components can be perceived in the interface, among them: (1) a list of objects 'stored' in the basket, comprising articles as well as photographs, and (2) a set of buttons and links that allow the user to execute a function, such as move the article to other basket, upload a media object, or create a new article. When the 'Create New Article' linked is selected (Figure 3-6), a form-based page appears. The user just has to 'fill in' the required information, select the section in which the article would be located, as well as select a template for the submitted article. The screen also offers a 'preview' capability, so the writer can visualize the page before it is being submitted for 'publishing'.

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[22] For such purpose, Pluto defines an *image* tag and assigns an identifier number for the picture. Therefore, the image is called with the following instruction: [image xxx], where 'xxx' is the assigned identifier. The new version of the software, HDL, removed this feature, while substituting it with a more dynamic media library.


**Figure 3-5:** Personal basket of a collaborator in the Pluto environment.

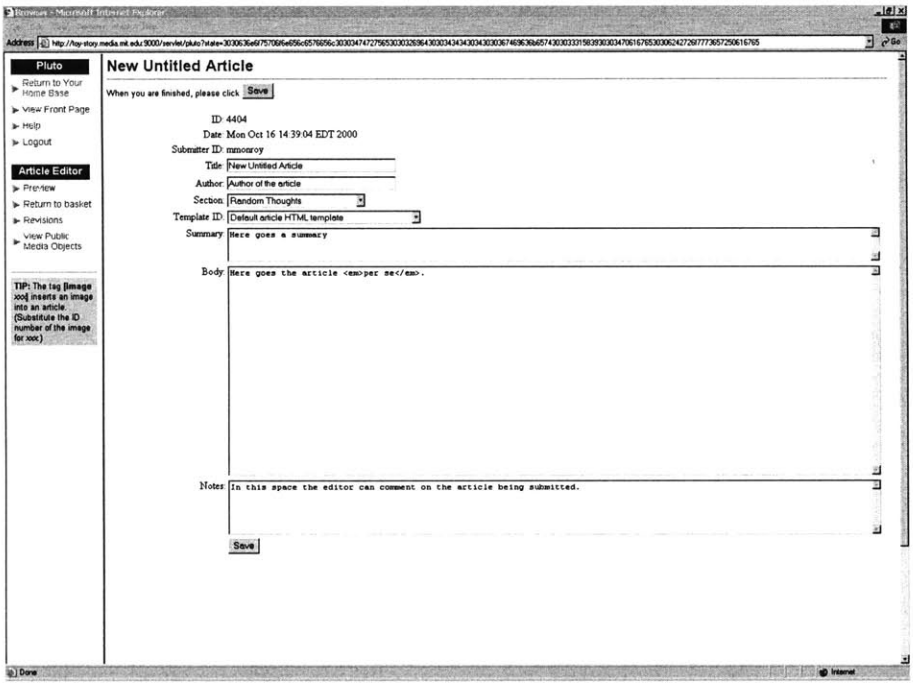


**Figure 3-6:** Form in Pluto for creating a new article.

After the page is saved in the server, Pluto dynamically generates the web page with the information submitted in the form, applying the corresponding template. The software also accepts HTML tags, if required.

Additionally, Pluto also offers internationalization capabilities, by just translating a file containing the system messages, as well as executing a simple modification of the startup file of the web server.

With such methodology, combined with the 'basket' analogy for transmitting the resulting web pages, Pluto automatically generates the online publication. Its content can be updated as required, and the program also offers an 'archive' option for storing old articles or photographs

### 3.2.2 HDL: a redefinition of Pluto

As the Silver Stringers project became more complete, and collaborators acquired new programming skills, Pluto required an update that would allow participants to elaborate more complicated templates, upload other media types such as audio or video, as well as redefining user permissions. This had to be done without affecting the collaborative process already achieved with the original software.

The first stage of this conversion was a new project called Goofy [Turpeinen, 2000]. One of the first changes made to the software was to present an overview of the content of the shared baskets, presenting the number of stories submitted by the members of the group, as well as the number of stories submitted by the collaborator. Turpeinen explains the purpose of this visualization,

> This allows the members [of the publication] to get and idea of the current status of the stories they have previously authored and submitted to shared baskets. The goal is also to improve the visibility of the flow of material through the Goofy system and to improve the user's awareness of the current state of the publication process [op. cit., 2000: 33].

While Goofy still conserved the 'basket' methodology, it also introduced a redefinition of basket permissions, including UNIX type permissions such as 'read', 'write' and 'access only'. This allowed collaborators to browse the contents of selected baskets, but at the same time, they were not allow, for example, to submit articles or change the contents of such basket. Another change introduced is the definition of different types of templates: a front-page template, a section template and an article template. With such types, collaborators can apply several designs to the web page, probably by

distinguishing each section with a characteristic color, or prepare a layout that allows certain number of photographs.

Goofy was also an effort to standardize the codes in which Pluto was built. For instance, Pluto is made of two servers. The first component is a 'servlet' server that provides the user interface as well as the web server and dynamic web page generation capabilities. The 'data server' on the other side, handles the back-end capability, providing an object store, name and directory services as well as a Scheme interpreter. While the servlet server was coded in Java, and it incorporated other Java elements such as servlets and Java Server Pages, the data server relied on Dtype dynamic data structures, consisting of LISP-like objects. Goofy added new Java components such as J2EE (Java 2 Enterprise Edition) and EJB (Enterprise Java Beans). Still, Dtype objects were still used.

In an effort to standardize the software, some of these elements were later considered in the programming of the new version of the Silver Stringers software, named 'HDL'. HDL is entirely coded in Java tools for its servlet component, but it now adds a MySQL database for managing the objects within the web server. It also incorporates recent web protocols such as XML (Extensible Markup Language) and XSLT (Extensible Stylesheet Language Transformation) for dynamically generating the web pages, and thus creates the online publication. In addition, HDL includes Apple's Darwin Streaming Server (http://www.opensource.apple.com/projects/streaming/), a media server that adds support to audio and video files to the environment.

The basket methodology is still the base of article transmission in HDL; however, baskets were categorized as three different types. The first basket type comprises a 'personal basket', which contains all articles written by the collaborator, and have not been submitted to an editor for its revision. Permissions are usually limited to a single user: the collaborator who owns the articles. The second type of basket comprises a 'public basket', which is just a shared basket in which collaborators can deposit their articles. The 'editors basket can be thought as one of this type of baskets. Finally, there is a 'publish basket' that does the 'printing' process of the online publication. Moreover, HDL permits to define more that one instance for each type of basket; for instance, the editorial environment can have several publish and public baskets, probably classified depending on the sections that make up the online publication.

Another important difference between HDL and its predecessor is that HDL installs the web server as a service in the host machine. While Pluto could be installed in any version of Windows®, HDL requires an NT-based server to run

the web server[23]. Nevertheless, the software keeps the original feature of accessing the environment using a web browser.

The HDL interface is similar to the Pluto interface, but includes elements defined in Goofy. The main screen (shown in Figure 3-7) was redefined for displaying the contents of his personal basket, as well as presenting the baskets to which the user can have access. The function menu was relocated in the upper part of the screen, providing a more direct access to common functions such as template design, browse the media library, or access administrative tasks. Naturally, depending on the user permissions a collaborator can perform administrative or design tasks. The menu also includes a search function, in which collaborators can look for a certain article or media object.

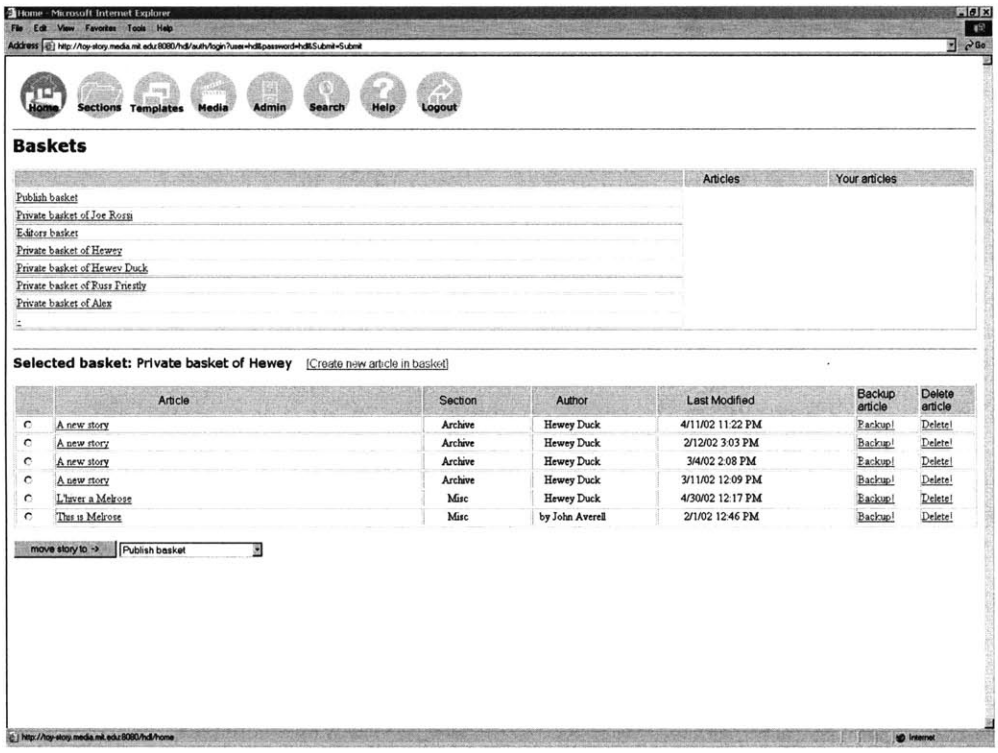


**Figure 3-7:** Main screen of HDL. The principal menu functions are relocated in the upper part of the screen; the contents of the personal basket, as well as the existing baskets are displayed in first place.

[23] The selection of Windows® as the operating system for Pluto and HDL is because it is the most common operating system found in computers, especially home desktops. However, with the increasing popularity of Linux-based systems, it is possible to develop a Linux version of the software. The portability of programs developed in Java was one of the main reasons for coding the application in such programming language.

Nevertheless, other HDL interfaces such as the 'New article' format and the template editor are similar to the original Pluto interfaces. HDL offers as well a 'Preview' function for the produced articles, as well as the media objects uploaded in the server.

Finally, HDL allows the user to create 'tags' that define formatting options, such as a list of sections, or text formatting. This is possible due to the XML capability of the tools, which can define new data types according to the content of the document.

## 3.3 Community Publishing and Language Preservation

HDL can be also offer internationalization options, by just translating the XSLT files that offer the front-end appearance of the tool. With such property, it is possible to translate the software into any other language, depending on the dominant language spoken in the region where the web server is installed. Therefore, the software has the potential of enabling a language-based environment, in which people have the opportunity of expressing in their native language.

It is somewhat paradoxical that a global publication such as the Junior Journal is published almost in the English language[24]. In fact, it is not strange to find online communities that use English as a common language among its members [Warschauer, 2000]. However, advances in technology make it possible to enter text in other writing systems, as demonstrated by the abundance of Asian-based websites. The outdated ASCII encoding cohabits with the more universal Unicode standards. Therefore, it is important to ask how to engage the community to express their ideas on their own language, and thus gradually reduce the dependence of a mainstream language.

Sociolinguists argue that the survival of languages is not dependent on the number of speakers, but it relies on two important factors: **will** and **transmission**. The sense of will states that the community is the sole responsible of deciding whether to maintain their native language or not [Fishman, 1991]. Transmission, on the other hand, states that the native language will survive if the community provides the necessary means for transmitting it to the next generation [Warschauer, 2000]. At this point, the need can be justified for developing language-oriented tools that permit the

[24] Recently the Junior Journal accepted articles written in other majority languages such as French and Spanish, that also have important audiences on the Internet (refer to Figures 2-1 and 2-2 of this document).

transmission of language to other people, especially if the communities are geographically disperse.

Nevertheless, a particular phenomenon occurs: while new media such as the Internet enables the possibility of making up a multilingual environment, the reality is that Internet users, despite their ethnic background, should rely on majority languages to be 'connected' to other people. It appears, thus, that achieving the proposed goal of a multilingual Internet should only rely on how to develop novel ways of transmission, but to create an impact on the will of people to use their native language to express themselves on the Internet. In other words, the sense of 'appropriation' of technology does not just involve the introduction of a new technology, but that the community realizes novel ways of using the given technology to satisfy their needs, among them communication in their own language.

A success story of such language revalorization is found in Hawai'i [Donaghy, 1998; Warschauer, 2000], where the native population was dispersed due to economic change and globalization. As part of revitalization efforts of recovering the almost extinct Hawaiian language, several technology solutions were developed, such as electronic bulletin boards or Internet browsers in Hawaiian. However, the most important progress was done when people started expressing themselves in Hawaiian language: in the forums, in the e-mail messages, in the information they upload in the Internet. It is in such stage when people can realize the strength of their community identity, and thus will have won a space on the Internet, which can be naturally shared with other persons.

If Pluto allowed senior citizens and teenagers to reaffirm their sense of community, and the will of conserving a language is strong among indigenous members, can active community publishing be useful to strengthen a minority language? At this point, there are sufficient arguments to answer affirmatively this question. Nevertheless, there are new questions to be figured out: Do all communities respond in the same way? What are the differences? Will the impact be the same in a developed or urban region and in a rural isolated area in a developing nation? And, in the end, is the community publishing approach a proper way for preserving a language?

The second part of the present document will examine such questions, and will consider the adopted theoretical framework in deploying a technological solution for a minority language in a developing country. In this case, HDL as well as digital photography will compose the technology approach for achieving the goal.

# Chapter 4. Under the *guaje* tree hill: Profile of the research location

At this moment it is important to recapitulate the essential points discussed so far. First of all, the Internet has provided a new communication channel, which in some way has shortened distances between participants. In addition, the Internet allows people to venture to 'unknown lands', navigating into different cultures and customs. Nevertheless, there are still significant differences on who has access to the Internet, reflected especially by the language content in cyberspace. It is evident that English is the most important language of the web, distantly followed by other mainstream languages, especially from those that come from Western Europe and Eastern Asia.

On the other side, minority languages are still underrepresented, yielding their place to national languages. However, there are examples in which efforts have been made to give minority languages a place on the Web. Nevertheless, most of the efforts have concentrated in developed countries with minority populations, provided the technology infrastructure already installed.

An important theoretical foundation of this work resides on the sense of community, as well as accepting that this term applies on the Internet as well. An approach for demonstrating the validity of this preposition constitutes the 'active community publishing' methodology. This methodology proposes the participation of community members in the creation and management of an electronic publication. Such online publication contains information targeted to those who share a sense of belonging with the community, no matter the geographical space in which the member is located.

From the previous section, it has been concluded that with adequate channels for transmitting information, as well as a strong will of the population to participate, a minority language can win a space on the Internet. However, some questions remained unsolved from the past chapters:

1. Is community publishing the best approach to increase a minority language penetration?
2. How does this approach behave in a different setting, for example, in a developing country?
3. What are the results expected from such an experience?

The second part of this thesis presents the results of fieldwork carried out in the Mexican state of Oaxaca. Such fieldwork corroborates the results obtained in other settings already described in the past sections. This chapter will provide an introduction on the state of indigenous languages in Mexico, and later

concentrates on the particular situation in the southern state of Oaxaca. Next, the chapter provides an overview of the organizational structure of most of the inhabitants of the state; in particular, the 'usos y costumbres' perspective will be studied. The chapter concludes with a localization of the research questions, now centered in the specific case of the state of Oaxaca, and based from their cultural and organizational profiles.

## 4.1 Indigenous people in Mexico: A brief historic context

Without any question, Mexico is the most populated Spanish-speaking country in the world. In addition, this North American nation is very well known by its ancient cultures that inhabited before the arrival of the Spanish in the sixteenth century. Nevertheless, about sixty ethnic groups inhabit the nation [SEDESOL, 1997a], constituting about 10 percent of the total population in the country [INEGI, 2000a].

Most of the Mexican ethnic groups inhabit the southern states of the country (as shown in Figure 4-1), coincidentally where many ancient cultures had been established for centuries. The regions in which they inhabit rank among the poorest regions in the country, characterized by high marginalization levels: lack of services such as running water and electricity, poor road access, limited health services and high indices of death in newborns. As a consequence, an important part of the population, generally adult men, migrates to other places looking for a better quality of life. While the migration centers concentrate in important cities in Mexico, other groups have ventured to migrate into the United States [SEDESOL, 1997a; Barabas, 2001].

The indigenous groups speak a wide array of languages and dialects, about 280 according to Grimes [1996][25]. This ranks Mexico in the fifth place in the world in terms of most number of languages spoken within a country. However, due to integrationist approaches, the indigenous population tends to be bilingual, thus leading to the language-shift process already described in this thesis.

[25] There are contradictory figures about how many languages are spoken in the country. The National Indigenous Institute and the National Institute of Geography report 62 languages [INEGI, 2000a; INI, 2000]. However, the Summer Institute of Languages has documented 280 languages in Mexico, but many of them comprise 'unintelligible variants' of a language; for instance, there are around 40 variations of Zapotec [see Grimes, 1996].

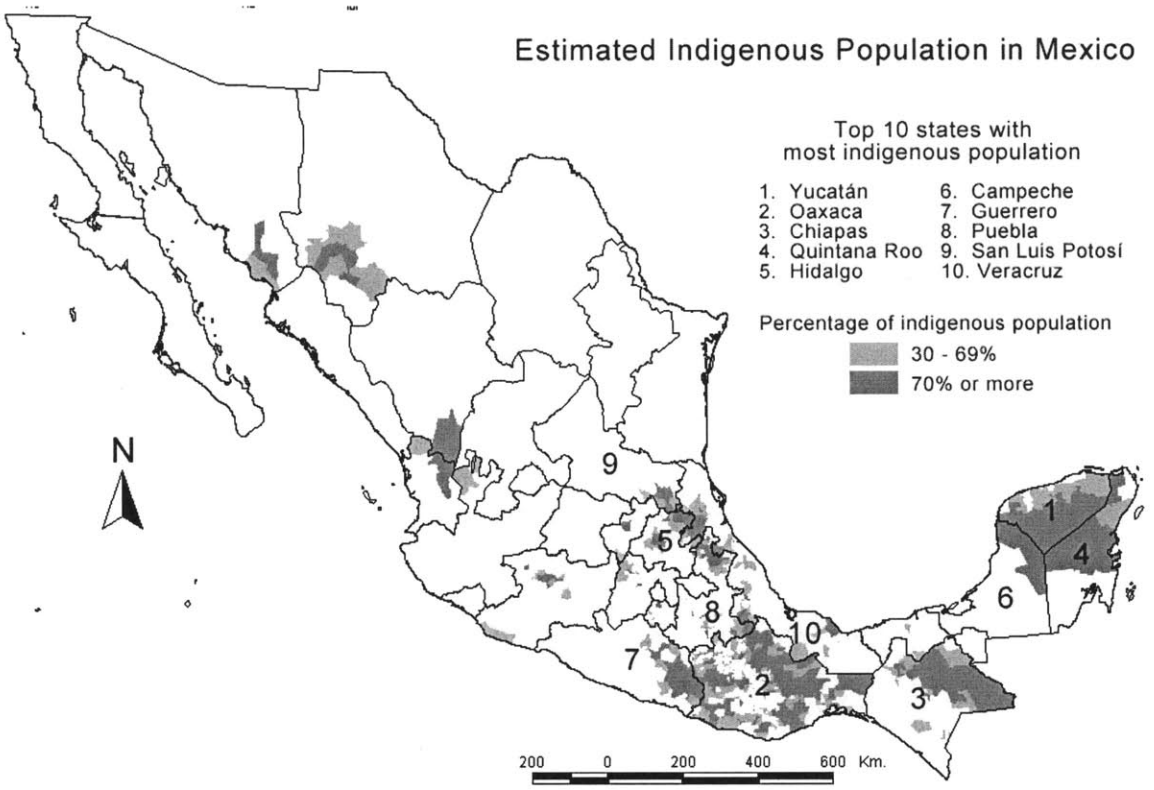


**Figure 4-1:** Indigenous population in Mexico. Notice certain zones with a majority of ethnic population, such as the south of Mexico and the Yucatan Peninsula (source: adapted from [SEDESOL, 1997a]).

A particularly high level of extinction characterizes the history and situation of Amerindian languages in Mexico. It is certain that the conquest of much of Mexico by the Aztecs preceding the invasion by the Spaniards, and the Spanish conquest itself, must have had a catastrophic effect on the language situation in the country [Wurm, 2001]. Proof of that is the dramatically decreasing indigenous population that occurred in the sixteen century, from 25.3 million in 1519, to 1 million in 1605. Such fact provides evidence that this must have meant also the death of many languages, approximately 120 according to Garza Cuarón and Lastra [1991].

From the Colonization period to the Zapatista uprising in 1994, the indigenous nations in Mexico have been characterized for being excluded of the national project of society, becoming the 'colonized' sector of the nation [SEDESOL, 1997a]. Guillermo Bonfil Batalla provides a definition of 'Indian' as derived from a colonized society:

> [The name 'Indian'] is a supraethnic category that does not denote a specific [population] content of the comprised nations, but denotes a **particular relationship** between [the indigenous nations] and other sectors of the population in which they belong. The category 'Indian' denotes the condition of 'colonized' and makes a necessary reference to the colonial relationship [...] The Indian was born when Christopher Columbus reclaimed Hispaniola Island in the name of the Catholic Monarchs [Ferdinand and Isabella from Spain]. Before the European arrival the population of the American continent was conformed by a great number of different societies, each one with its own identity, and with different grades of development, from the high civilizations in Mesoamerica and the Andes, to the gatherer bands in the Amazonian forest [Bonfil Batalla, 1995; emphasis added].

From this it is implied that the 'Indian' as a person does not exist; instead it denotes a category, comprising those conquered by the colonizers. The relationships between the government, those who rule the country, and the original nations of the continent have been characterized for begin asymmetric, sustaining this relationship between the conqueror and the conquered. Being 'Indian' is being conquered; it means exclusion, injustice and inequity. Therefore, a native person who wants to succeed in the national society must leave the role of 'conquered', sometimes leading to the denial of the ethnic origin, and thus losing his cultural heritage.

Even after Mexico won its independence from Spain in 1821, the indigenous nations were subject to special rules and laws that emphasized the differences between them and the dominant white and mestizo ethnic groups. Additionally, the agriculture needs from the dominant society derived in massive dispossession of communal lands, already maintained by native groups. As a consequence, many of these groups were displaced to isolated regions in the nation. Those who remained loyal to their homeland became the exploited labor force that worked on the fields.

After the Mexican Revolution of 1910, and the creation of the Constitution of 1917, some of those lands were given back to the native communities under the new 'ejido' (communal land) legislation. By the same time, the 'Casas del Estudiante Indígena' (House of the Indigenous Student) were created in Mexico for native children [Durand Alcántara, 1998]. Under the 'integrationist'[26] approach, the applied educational model encouraged the development of a homogeneous nation, united under a same language and same customs. The objective was to "mexicanize the Indian and not to indigenize the Mexican". The

[26] See Section 2.2 of this thesis.

application of such philosophy derived in an accentuated loss of the indigenous identity, for the sake of achieving the 'national identity'.

It is until the1960s when bilingual education is introduced in indigenous nations. Still, this approach still uses an integrationist approach by encouraging the use of a national language (Spanish) as a vehicle for understanding among the inhabitants of nation. Ironically, Spanish is now used as a 'lingua franca' among ethnic groups in the country[27]. The results of this policy are quite noticeable; indeed, 8 out of 10 persons that speak an indigenous language also speak Spanish [INEGI, 2000a].

A crucial step was taken in 1992 when the Mexican Constitution was modified for including the indigenous groups as part of the nation, and thus recognizing the 'indigenous nation' as a legal entity under the Mexican Law.

> The Mexican nation has a multicultural composition, stemming originally from its indigenous communities. The law will protect and promote the development of their languages, cultures resources and specific forms of social organization and will guarantee to the members of those communities effective access to the jurisdiction of the state. [quoted in García, 1999]

This was an important step for recognizing the indigenous factor as part of the national identity, yet it was not sufficient for ensuring a change in the situation. For instance, few states introduced changes in their laws recognizing the multicultural heritage of the nation. Nevertheless, the state that introduced more changes to their laws is Oaxaca. Being the state with the most ethnic diversity in the nation, it introduced in the 1990s several changes to existing laws concerning its indigenous groups[28]. For instance, there is a law recognizing the rights of indigenous people in the state as to forms of education. The State Education Law comprises and article which encourages "bilingual and intercultural education to all indigenous communities", clearly stating that "such education shall be taught

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[27] An interesting case is mentioned in Pardo and Acevedo [2001]; she mentions that "although it is observed that Zapotec traders widely used Spanish as a neutral language, until very recently they learned the languages of the villages they visited for streamlining their commercial transactions, probably as part of a tradition" [op. cit.: 37 footnote 2]. My personal experience with the Coalition of Bilingual Teachers in Oaxaca, corroborates this increasing tendency of using a mainstream language for 'common speech'. Teachers are proficient with their respective indigenous language, but the use Spanish for communicating between them. In addition, most of the teachers do not know another indigenous language besides their own (for instance, Mixtec people do not know the Zapotec language).

[28] A compilation of all the state laws, as well as the Constitution of Oaxaca is available on the Internet: http://www.oaxaca.gob.mx/tecnica/legislacion/.

**in the native language**, and in Spanish as a second language"[29]. The Oaxacan Constitution is the first in the country to recognize traditional forms of government and organization, and is the first to apply the 'autonomy-determination' approach proposed by Díaz-Polanco [1985].

In the past decades, other efforts have been carried out to provide a space to the indigenous people. One of such efforts has been performed by the Summer Institute of Languages. Since the 1930s this organization has been working on the documentation of indigenous languages in the country, as well as creating materials such as dictionaries and grammars, as well as developing writing systems for the indigenous nations [Pardo, 1993][30]. On the other hand, the National Institute of Indigenous Affairs created in 1979 the System of Cultural Indigenous Radio Stations ('Sistema de Radiodifusoras Culturales Indigenistas', SRCI), as an effort to provide a space to native cultures in the mass media space [INI, 2000]. There are currently 24 radio stations incorporated in the system, virtually covering all indigenous regions in Mexico. The radio stations transmit in 31 indigenous languages and Spanish, comprising a potential audience of 6 million people of indigenous background.

While it is apparent that some ethnic groups are now the center of attention of government plans, other ethnic groups are facing extinction. Nineteen languages in the country account less than a thousand speakers, resulting the possible extinction of the native tongue in the course of 25 years [Wurm, 2001; González, 2002]. The majority of these groups are located in the northern part of Mexico, where there are fewer programs than in the southern part of Mexico. People belonging to such ethnic groups still do not have legal protection from the state governments. Possibly in the next years, official institutions can propose legal reforms to their laws for including such 'endangered cultures' into development

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[29] Oaxaca is a pioneer in Mexico for offering Bachelor's degrees to indigenous students in indigenous-run institutions, such as the 'Normal Mixe' ('Normal' refers to the institution that offers education to future teachers in basic and middle level). However, the northwestern state of Sinaloa deserves recognition for founding the first Indigenous University of the American continent. Opened in 1999, the university of Mochicahui attends the Mayo ethnic group, and it aims to reach other ten ethnic groups in northern Mexico. Oaxaca is planning to open its indigenous university in the Oaxacan city of Juchitán sometime in 2002 [see Jiménez, 2001].

[30] Despite all the research work carried by the Summer Institute of Languages, this institution has been highly criticized by indigenous organizations, not only in Mexico but in several other countries, for "acculturating and converting populations of Indians to the ways of the government [...] and overlaying Christianity and all of its trappings atop the native ways". This last point is worth mentioning, due to the links of the Institute with the Wycliffe Bible Translators (both organizations were founded by the same individual) [Group Watch, 1989]. SIL has been blamed of converting several groups into Protestantism, and thus creating divisions among the communities, leading to their fragmentation. In the case of Mexico, the government "invited" the institution to leave the country in the 1980s, but the group still carries out research in several settings throughout the country. An overview of the work carried out by this institution is discussed in [Hvalkof and Aaby 1981; Alisedo et al., 1981; Durand Alcántara, 1998].

programs in their respective states, possible by means of well-conducted language and culture revitalization programs.

From this historic context it can be perceived that despite the legal changes and the economic developed programs, the relationship between the country and its indigenous people should be revisited. If discrimination, legal contradictions and misunderstanding of native practices persist, the ties between the indigenous groups and the nation will become weaker. If the government is willing to promote the diversity of the nation they should follow a very simple rule: projects should encourage the development of the culture of native groups instead of substituting them, regardless the attended area: economic, health or technological. The integrationist approach is not an option anymore; the cultural richness of a nation is sustained by its diversity, and the nation itself should encourage projects in which the local heritage is enriched and preserved. Only with a deep understanding of the cultures that conform the nation, a better quality of life would be achieved by those groups.

The current situation of the indigenous groups in Mexico poses challenges in every field included the technological development of a usually underserved region. Accepting one of such challenges, the preservation of minority languages, possibly is the first step towards revaluating the native heritage of Mexico. Having known the current indigenous situation in Mexico, it is time to introduce a profile of the place in which the research took place.

## 4.2 Profile of Oaxaca

### 4.2.1 Geography

Oaxaca is located on the southern part of Mexico, next to the Pacific Ocean, and sharing the rest of its borders with 4 other states: Guerrero, Puebla, Veracruz, and Chiapas. Oaxaca is the largest state south of Mexico City, covering an area of 95,364 square kilometers[31], which ranks fifth in terms of the national territory.

Oaxaca is characterized by its rough and contrasting geography. On one side, two of the most important mountain ranges in Mexico meet in the state (the Eastern Sierra Madre and the Southern Sierra Madre). On the other, the Isthmus of Tehuantepec, the shortest stretch of land between the Pacific and the Gulf of Mexico, is located on the eastern part of Oaxaca. Its 400-mile coastline with tropical vegetation contrasts with its 10,000 feet high mountains covered with different species of pines. In the center part of the state there is a three-branch

[31] Approximately 36 820 square miles, or the size of Maine, Connecticut and Rhode Island combined.

fertile plateau where the capital state, Oaxaca de Juárez[32], is located. The climatic variation is also extreme, ranging from tropical and humid in the coast, to cold and rainy in the mountainous region.

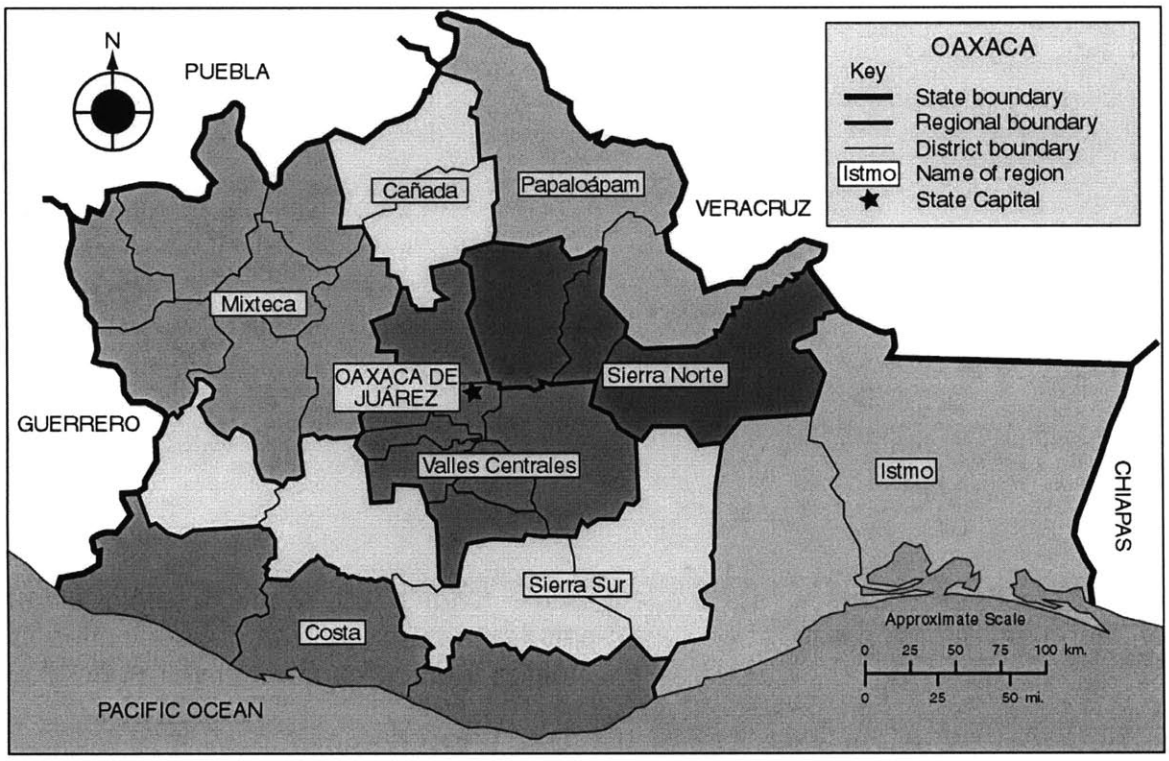


**Figure 4-2:** Map of the state of Oaxaca, showing regional and district boundaries. (Source: adapted from [INEGI, 2001]).

The population of the state is approximately 3.5 million inhabitants, of which 20% is concentrated in the Central Valleys region [INEGI, 2001]. The state is divided into 8 geopolitical regions [INEGI, 2001], 30 districts and 570 municipalities. In terms of the number of municipalities, the state ranks first, and in most of the cases, the municipality is comprised just of a single town, the municipal seat[33]. Figure 4-2 shows a map of the state with its regional and district boundaries.

[32] Oaxaca de Juárez is the official name, but people simply call it 'Oaxaca'. To differentiate the capital city from the state, the former will be referred in this document as 'Oaxaca City'.

[33] Municipal fragmentation is mostly present on southern states in Mexico. States bearing second and third place in number of municipalities (Puebla and Veracruz) possess some 200; Chiapas created 8 new municipalities to the existing 111, giving a new total of 119; Yucatan has 106 and the State of Mexico has 124 [INEGI, 2000a]. A curious case is in Tlaxcala (central Mexico): being the smallest state in the country (twice the size of Rhode Island), it has 60 municipalities. Probably it is coincidence that the first places to be occupied by the Spaniards in the 16th century,

There are historical as well as social causes for this municipal fragmentation in the state. Such fragmentation mainly obeys to the sense of identification and belonging to the community, ethnic composition, as well as disputes in land property among communities. Such factors provoked that many municipalities in the state just comprise a single town, or a town plus several settlements called 'agencias' (ranches). This perspective of identification and independence from the communities had a side effect however. Migration processes occurring in the past century, as well as social conflicts such as the Mexican Revolution, provoked that the population of many municipalities registered several variations. Nowadays, it is not strange to find municipalities that have less than 2000 inhabitants. In fact, that was the minimum population requirement for conforming a municipality, before the law reform in 1942, when the population requirement was raised.

As a measure to stop such fragmentation, the state laws were reformed for not allowing new municipalities to be formed within the state limits [Pérez Jiménez, 1968; Gobierno de Oaxaca, 2002]. However, municipalities can be rearranged by means of merging two or more municipalities. According to the current state legislation (Article 59 sections VII and VIII of the Constitution), municipalities should have at least 15,000 people to be incorporated, as well as "assure that [the municipality] with possess sufficient elements for its subsistence, administration and development". However, this condition posed a threat to the identity of the communities, provided that 90% of the current municipalities do not comply with this population requirement. The district system solves in part this conflict; communities that share a common background are encompassed under one district, but on the other side, individual municipalities maintain their identity as a community, reflected on the election of their representatives using the traditional 'usos y costumbres' paradigm.

### 4.2.2 Population and linguistic profile

Of the three and a half million inhabitants that the state accounts, approximately 70% of the population has indigenous background; this is one of the highest percentages in the country [Gobierno de Oaxaca, 2001]. Additionally, one out of three state inhabitants speaks an indigenous language, ranking second in the nation. Only the state of Yucatán has the highest percentage of indigenous speakers, but only by a slight margin [INEGI, 2000a]. Figure 4-3 shows the proportion of indigenous language speakers in terms of the total population of the state. It is important to point out that while there are regions in which an

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as well as having more native population are the states with more municipalities in the country [Pérez Jiménez, 1968].

indigenous language is still present, notably in the Sierra Norte and the High Mixteca regions. On the other side, other regions, such as the Central Valleys and the Northern Mixteca, have reduced their indigenous tongue presence.

Oaxaca is considered the most ethnically diverse state in the country, given the presence of 15 indigenous ethnolinguistic groups[34] inhabiting the state, though several groups have been decreasing over recent years. Most of the languages spoken in the state belong to the Otomanguean language family, which includes the Zapotec and the Mixtec language groups, the most important indigenous languages in the region. However, other four language groups are present in the state: the Mixe-Zoque, the Huave, the Tequistateco-Jicaque and the Uto-Aztec. As a result of educational programs exercised in the state, most of the indigenous inhabitants are becoming bilingual, and consequently, the number of monolinguals has constantly descended in the past decades [Mena Ledesma and Ruiz López, 1996; Pardo 1993; Pardo 1996].

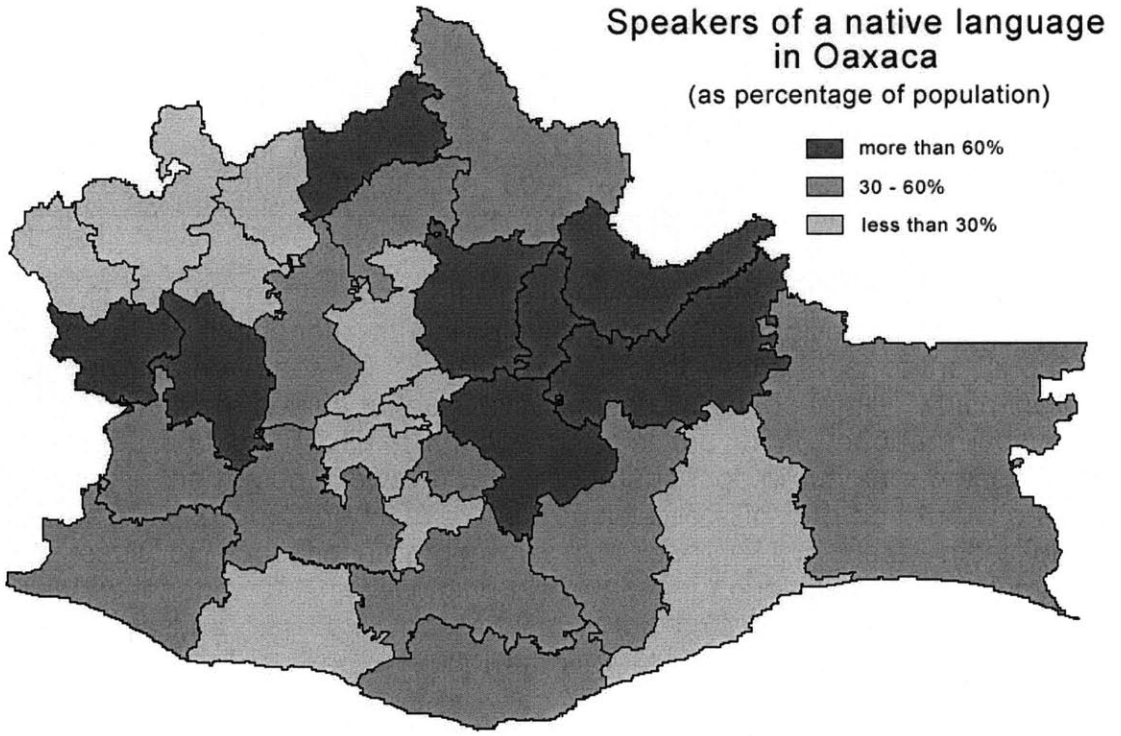


**Figure 4-3:** Map showing the proportion of speakers of a native language in Oaxaca, expressed as percentage of population, and classified by district (Source: adapted from [INEGI, 2000b]).

[34] The definition of 'ethnolinguistic group' will be the one used in Pardo and Acevedo: "a set of languages and dialectal variations (regional, social and stylistic) that present so many similarities among them that they have been comprised under a same criterion" [2001: 33].

Figure 4-4 portrays the linguistic composition of Oaxaca, mentioning the most important languages spoken in the state. From this information it can be noticed that there are two dominant linguistic groups in the state: the Zapotecs and the Mixtecs. Actually, both ethnic groups rank third and fourth, respectively, in terms of number of native speakers in the country. Those languages, however, also encompass numerous dialects and variants, some of which are unintelligible between them. For instance, Grimes [1996] affirms that Mixtec encompasses some 20 variants, while Zapotec encompasses about 40 dialects.

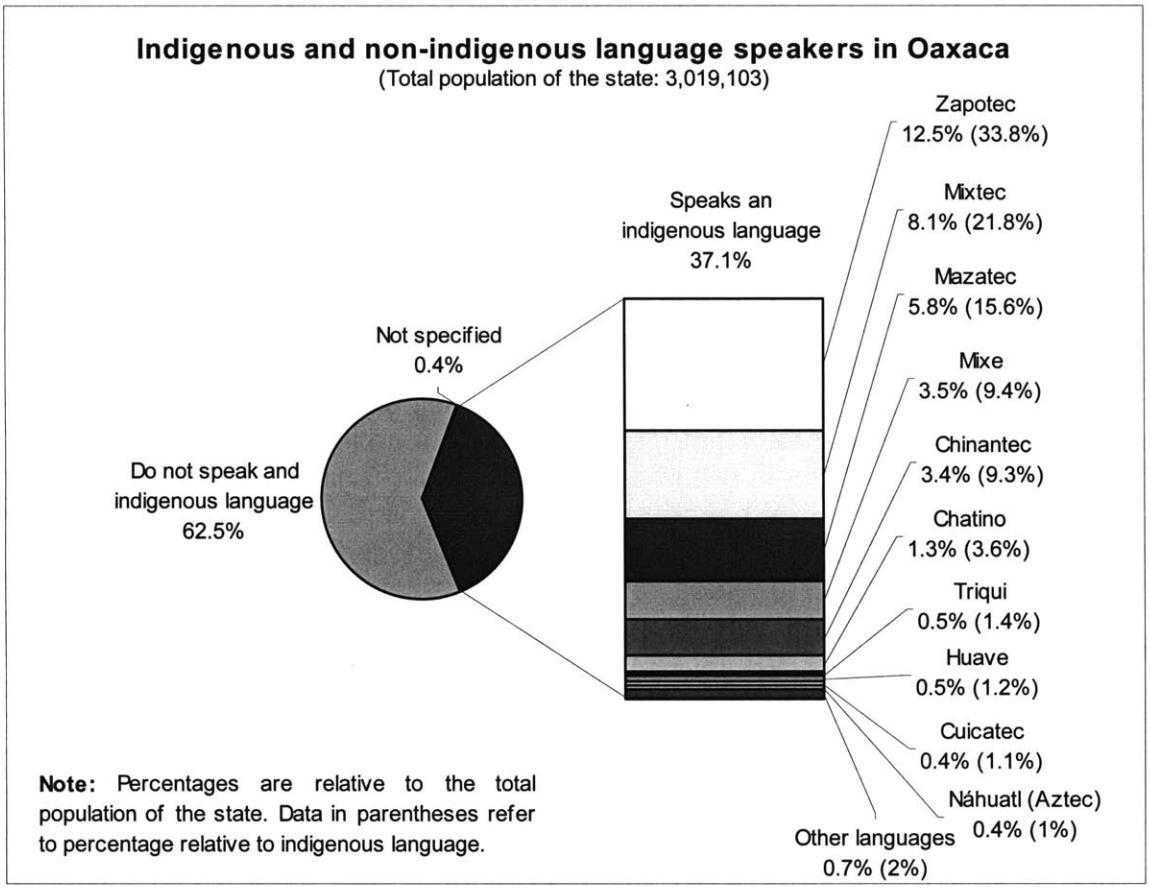


**Figure 4-4:** Population of Oaxaca according to their native language. Only indigenous languages are highlighted (Source: based on data of [INEGI, 2001]).

For exemplifying this variation, Castellanos [1999] considers the case of the Zapotec language; the author argues that such variation of the language is a consequence of the fragmentation process suffered in the colonization period in Mexico, which lead, as mentioned before, to the isolation and relocation of native cultures from their original places. Consequently,

> The language that we, the descendents of the 'benegorasa' [Zapotec ancestors] speak, is the clear example of this situation: communities that are separated by a hill, a river or a road already present notable differences in their was of speech. Among communities separated by more than 20 kilometers (12 miles) communication in Zapotec is difficult, and from region to region is virtually impossible. [op. cit., 1999: 91].

Nevertheless, some indigenous languages have a strong presence in the state. The southern city Juchitán, for instance, publishes several newspapers in the Isthmus Zapotec variant, and the native language has the same presence as Spanish [Pardo, 1993]. The National Institute of Indigenous Affairs has four indigenous radio stations in the state [INI, 2000]. Still, indigenous presence in other mass media such as television is very limited.

## 4.3 'Usos y costumbres': governing under native traditions

As mentioned before, the national government recently granted legal recognition to traditional forms of government and social organization among the indigenous groups in the country. They have exercised such forms of organization long before the arrival of the Spaniards. While several groups succumbed to the imposition of a new government hierarchy, many groups resisted and continued exercising their usual customs and rules. Many of such rules continue nowadays, and currently cohabitate with Western forms of government such as the municipality and the formation of political parties. The set of traditional customs that govern the social interactions among the native groups are usually referred as 'usos y costumbres' (uses and customs).

In the following subsections we comment on some of the traditional ways of government and organization: the 'sistema de cargos', which rules the assignment of persons for occupying public charges in the community; the 'tequio', which involves the participation of the population in community-oriented projects; and the community assembly, which is the way in which community decisions are taken among members of the community. The relevance of this section consists of understanding how communities work under a traditional set of customs and rules, and such as understanding is basic as a way for introducing new projects so they can be adapted according to the needs of the community.

### 4.3.1 The 'Sistema de Cargos' and the 'Tequio'

While customs and organization may vary among the different indigenous nations conforming the country, the objective is well defined: how to engage members of the community for administrating the issues concerning the community. The organizational structure of a native community is dictated by a hierarchy-based system called 'sistema de cargos', which can be translated as 'public office system' or 'charge system'.

In the case of the ethnic groups in Oaxaca, the 'sistema de cargos' is based in the fact that members of the community, men or women, should occupy and manage different public positions throughout their lives within a community. Such public positions cover all levels of administration and management of the village: social, religious (organizing the community patron saint festivities, for example) or government positions. The participation is usually mandatory and people get involved in such system since they are very young (sometimes when they are under 18). At the beginning, a person holds a position with limited responsibilities or involves simple tasks. As time passes, usually after a period of rest, the person moves along several positions and charges, so he or she can move into the next level of responsibility after some time, depending of the achieved results. This public-office hierarchy does not finish with occupying a high position, such as becoming the mayor. The person can continue to hold other positions until they "retire", when they can enter an 'elders council', which usually has a moral function in the community, providing advice to the community assembly. At that very moment, the person would have occupied not less than 10 public offices throughout his or her life [SEDESOL, 1997b; Cohen, 1999].

However, not all persons can occupy high-level positions in the community. The eligibility of a person for taking charge of a position depends on the work carried out in lower-level charges that he or she have occupied in previous occasions. In addition, the community government has already set determined criterions or profiles for people who need to occupy the higher positions, included desired capabilities and qualities that a person should possess. This is important, provided that higher positions include taking responsibility of vital community situations such as land property, justice and security, or taking charge of the municipality.

A very distinctive aspect of this hierarchy system is that the person in the public position perceives no salary for occupying the position, even the mayor of the village. In the contrary, the person usually spends money and resources for accomplishing the responsibilities acquired with the position. However, this does not mean that the community position is the only activity they can exercise. During their rest time (their 'sabbatical' time), they can work in other

remunerative activities, such as agriculture or commerce. Some of the income, therefore, can be destined to cover the expenses produced from their public office charge [Cohen, 1999].

Participating in this traditional hierarchy becomes a source of respect and privilege for a member of a community. It creates a sense of belonging to the community, as well as providing identification with their customs and heritage. Extending this system to a community level, having a public position reinforces the bonds among members of the community: by the participation of all people, the community can subsist, and therefore achieve a benefit not only for a person, but also for the community in general. This is also applicable to those who emigrate from the native community: they are also eligible to occupy charges within the community. The result is a migration cycle in which people return to their native community from time to time to fulfill their 'cargo'. If the person is not willing to fulfill the 'cargo', he or she can lose its ties with the community.

Nevertheless, while some people take office in the community, what are the roles of the rest of the adult population in the community? Another traditional pattern deals with the contribution of the residents of the community to achieve projects envisaged by the municipality. While some village residents are the ones that occupy representative positions in the community, the other residents can collaborate in activities that are for the benefit of the community. Such custom is known as **'tequio'**[35], which is just the collective work that is organized around projects of the formal municipal authority, based in a sense of public duty among the community citizens [Acevedo and Restrepo, 1991; Cohen, 1999].

Some of the activities that comprise the 'tequio' generally involve common maintenance labors such as garbage collection, street cleaning, or in some instances, painting and repairing public buildings such as schools and the municipal offices. In other cases, people can contribute in more complicated projects such as constructing a public building or preparing the festivities of the local saint.

Adult men and women are required to attend 'tequio' if it is required. If they cannot attend, they can establish terms in which they can fulfill their 'tequio' requirement. Those who do not cooperate with 'tequio' are subject to sanctions, or become imprisoned for short terms. Recurrent failures to comply with 'tequio' may result in the expulsion of the community [SEDESOL, 1997b; Cohen, 1999][36].

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[35] For the Náhuatl 'téquitl': work, tribute [Gómez de Silva, 2001]. Ironically, the current sense of this word comes from the Colonial period, in which the native people paid tribute to the church with labor, without perceiving a salary. It is also applied to a non-imprisoning punishment for those who committed a minor offense.

[36] This situation accentuates with the recent installation of Protestant groups in many regions of Oaxaca, and the recent conversion of some villagers to Protestant denominations. Indigenous

While 'tequio' has persisted as a cooperation pattern for villagers, the current migration and economic situation have somehow modified how 'tequio' is done in the community. For example, a person who works outside a community (generally in an important town of the region) sometimes cannot go personally to work on the assign labor. Thus, a possibility is to pay another person to do the required tasks, and thus accomplish his or her participation on the task.

Another option for fulfilling 'tequio' is to collaborate not with labor but with monetary funds for supporting a local project; for instance, the organization of the community yearly festivities usually involve the investment of large amounts of money for food, clothing, rent of equipment and other expenses. While villagers often cooperate with the organization, sometimes investing a large amount of their yearly incomes, this is the option preferred by migrating villagers, provided that they have better incomes. Sponsoring a big festivity is also regarded as a source of prestige and recognition from the community to the sponsor or sponsors, and thus, keep their bonds with the village in spite of being outside residents since a long time.

### 4.3.2 The community assembly

There is another institution that differs from the democratic institutions and government structures. Instead of the representational scheme adopted by the national governments, native communities consider the opinion of the entire population for creating laws and rules for the community. Consequently, the authorities must conceived laws based on the opinions of the community.

The space in which the authorities and the community mediate is the 'community assembly' ('asamblea comunitaria') [SEDESOL, 1997b]. In this space, both the community and the authority discuss local issues and decide on certain issues, from land claims and properties, to the election of the mayor of the village, to the creation of committees dedicated to manage community resources such as electricity or handcrafts. The assembly is considered a forum of decision-making, and everyone is free to discuss the pros and cons of the treated issues. The outcome of this space is a consensus among the government and the governed, and consequently a community decision in which members have agreed to follow.

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town have acquired a strong Catholic conviction, and those who decide to convert are usually seen with disdain. While converted faithful can continue to participate in some 'tequio' activities, they refuse to participate in the Saint festivities, due to the presence of Catholic elements. This has created frictions and divisions among members of the communities. Consequently, this situation became for traditional villagers a reason for rejecting outside projects that can modify or eliminate long-time traditions in the communities [Cohen, 1999; Martínez García, 2001].

One of the most common practices involving a community assembly is the election of the community mayor. Contrary to the secret vote approach used by democratic nations, the traditional way involves a community assembly in which citizens propose some possible candidates, and then, the adults cast their vote openly, in front of the community. As an example, Cohen [1999] describes this process for the village of Santa Ana del Valle, in the Central Valleys region:

> Village elections are conducted as an open ballot. After nominees agree to run, their names are listed on a blackboard in plain view. At this point, candidates or their supporters can make statements promoting their election. Following the speeches, each Santañero [resident of Santa Ana] walks to the blackboard in front of the room. Before the entire group, the voter takes a piece of chalk and marks his choice. [Cohen, 1999: 128].

Such way of open-ballot vote is actually present in the great majority of communities that have an important indigenous background. While political parties are present in big cities or municipalities comprised of several villages, the open ballot system is mainly exercised by small communities. This community system however is widely used in the state: about 70% of the municipalities select their mayors using this system, and such system has been fully recognized in the State Constitution [SEDESOL, 1997b; Gobierno de Oaxaca, 2001; Gobierno de Oaxaca 2002]. However, paper ballots are used in the case of state or national elections, under the 'secret vote' modality[37].

Migration has somehow played a role on the community assembly. There exists a debate on the inclusion of migrating community members on the community affairs. However, such citizens usually contribute with the communities in economic terms. As mentioned before, migrating workers are an important source of income for communities as well as their families [Conway and Cohen, 1998]. They also have contributed in the development of services and infrastructure for their villages, as well as financing the local celebrations. Resident members saw this as an important reason for still being considered as members of the community: they demonstrate their community commitment and belonging by contributing in the well being of the village.

Such phenomenon has interesting consequences. For instance, in several villages, migrant members of the community can hold public positions in their communities, even as mayors. In addition, community decisions have transcended geographical limits. The development of communications allows the

[37] However, there are well-known stories of vote manipulation to favor the official party. Such phenomenon is mainly present in rural regions across Mexico. Nevertheless, since the formation of the National Elections Board (IFE in Spanish), fraud is less probable to occur. Nowadays, opposition parties have won more municipalities in recent years, especially in the southern states.

discussion of local issues not only inside the community, but also between community assemblies localized in other cities, states, or even outside the country [SEDESOL, 1997b]. In such way, the community can still reach a consensus among all the members, and thus conserve the main intention of the community assembly.

## 4.4 The core questions, revisited

Before the actual deployment of the online publication in Oaxaca, it was necessary to know a general profile of the state: the geography, the historic background, and the government rules of native communities. The purpose of knowing such background provides important implementation data, in terms of understanding the possible users of the proposed methodology. Understanding the migration phenomenon and the sense of belonging extends the possibility of developing an "international" online system for establishing a link between communities. Knowing how the assembly community works allows results useful for introducing the project to native residents. It also provides and outlook on possible infrastructure and access issues: how to gain access to the community? Are there electricity or telephone lines in the community? Is there a possibility to deploy a communication system as part of the online publication proposal?

As a result from this place analysis, some core questions, now applied to the Oaxacan context, can be generated and categorized according to different factors. A compilation of such questions is presented.

**Geography –** What is the geographical situation of the community? What are the surroundings like? What forms of access exist to reach the community?

**Environment –** What is the nearest important city? Do villagers commute frequently to the important city? What is the migration flow of the population? What is the relationship with other surrounding villages?

**Infrastructure –** Does the infrastructure exist for installing a computer (electricity, telephone lines)? What is the phone line penetration inside the community?

**Economy / Project sustenance –** Who is paying for the electricity and telephone expenses when the computer is deployed? Can the community afford the payment of electricity, telephone or connectivity? Are there options for financing such expenses?

**Attitude –** What is the attitude of people toward technology? How to attract all possible users to participate? Are the participants selected beforehand or are

they volunteers? Can they organize by themselves, or do or they require assistance from an outside person?

**Knowledge / training** – Do the participants have previous experience using a computer? Do participants have navigated in Internet? What is their ability to learn new concepts / terms? Is there a computer-skilled person that can help in the learning process? Do participants have self-learning abilities?

**Program interface** – Is the program interface easy to use by participants? What are the potential problems that the users may experience?

**Additional resources** – Do the participants have access to other devices such as cameras, recorders or video? Do those devices have computer interfaces? Do the participants know how to operate the equipment?

**Language** – Is there a written system for the minority language? What is the written language proficiency of participants? In which language do they express among themselves? Does the interface need to be translated? In what language do the participants express on the Internet?

**Audience** – What is the target audience of the publication? Can they collaborate in the publication? Are other audiences expected other than the community members?

**Adoption of the new technology** – What information is uploaded in the online publication? Is it in a mainstream or minority language? Are participants enthusiastic for keeping up the project? Can participation in the publication be considered as a form of 'tequio'? Does the publication reflect the point of view of the community?

Such questions will provide a specific **framework** in which an online publication could be deployed in a community, in the state of Oaxaca to be more precise. Such proposed framework comprises different factors to be considered. The compliance of such factors provides indicators for the adequate deployment of the proposed online technology. By working on such questions, both the community and the technology provider can work for an online solution for a minority language, based in an online publication.

Now that the framework has been proposed, it is time to prove it in a real scenario. That is the purpose of the next chapter, in which the proposed online solution, as well as the framework will be evaluated.

# Chapter 5. Implementation and Evaluation of the Proposed Framework

In the past chapters, we discussed the analysis and design processes for deploying the minority language online publication. Inferred from the theoretical foundation, the core questions were defined for the proposed solution. The knowledge of the traditions of the target group provides a basis for developing a solution that does not affect their customs. It is important to keep in mind that the solution must not redefine the set of traditions of the community. On the contrary, the community will propose solutions from the resulting framework. "Adoption and not assimilation" is the premise for the project. The craft or tool is HDL; the users are the community members (initially, in Oaxaca; later in migrant destinations in Mexico and the U.S.A.); the target audience is the ethnic group or groups they represent; the initial geography space is Oaxaca.

Having named the main characters on the methodology, it is time to describe the implementation process for the online publication. First, a brief description of the participating groups will be provided, emphasizing their leadership in the activities they perform in the state. Then, the implementation process is defined. Such implementation process covers two global stages. The first stage corresponds to a one-weekend course covering an introduction to Internet, an introduction to journalism, and training on the use of HDL. The second stage corresponds to a follow-up process to the organization and the submission of the first articles. Finally, the technology panorama is described, justifying the installation of the server in the city of Oaxaca, and not in a local community.

The chapter ends with an overall evaluation of the framework as well as the participating components. Emphasis will be put in the problems encountered, provided the lack of infrastructure within the state, and an action plan for the sustainability of the project is presented, including future scenarios. Some recommendations and a step-by-step methodology will be proposed in this chapter as well.

## 5.1 Participating Institutions

The first step of the implementation involves the search of strong, independent institutions that have a strong commitment with the community, run by local people, open to technology and that could help in the process of revitalization of language and culture. By recommendation of Manuel Gándara, I contacted two groups based in Oaxaca City: the 'Coalición de Maestros y Promotores Indígenas de Oaxaca' (Coalition of Teachers and Native Facilitators of Oaxaca,

referred from now on as 'the Teachers Coalition'), and the 'Unión de Museos Comunitarios de Oaxaca' (Union of Community Museums of Oaxaca, referred as 'the Museums Union'). Such groups have been established in the state for a long time, and have indigenous members working on several projects. I will present a brief profile of such institutions in the following paragraphs.

### 5.1.1 The Teachers Coalition

Founded in 1974, the Teachers Coalition [CMPIO, 2000] is the result of forming an independent organization that encloses rural native teachers, centered in community work as well as fomenting bilingual education in isolated communities. At the beginning, the Coalition supported the 'castellanización'[38] programs dictated by the Ministry of Education, but currently it encourages bilingual and bicultural education for the state schools. This group is one of the promoters of the elaboration of textbooks in an indigenous language, as well as the modification of education laws recognizing indigenous language courses. While it still depends on the Ministry of Education of the state, they have well-focused objectives given their indigenous background.

It currently comprises some 800 indigenous teachers in the state, covering the elementary level of education. Their organization is based on the 'public office' system described in the past chapter; supervisors are renewed every three years. Decisions are taken in a community assembly, and such decisions are carried out in the terms defined by the same assembly. Teachers usually participate in courses and workshops, and get involved in the organization of meetings between the school and the parents. In addition, every year the Coalition organizes several regional and statewide reunions in which teachers have the opportunity to share their experiences, as well as presenting current issues related with indigenous education.

The mission of the Coalition is enclosed in the 'Movimiento Pedagógico' ideal, which resumes the objectives of indigenous education in the state: (1) the revaluation and development of indigenous cultures, (2) the increasing presence of science in indigenous schools, (3) the democratization and humanization of education, (4) the protection of the environment and the development of the local economy, and (5) the encouragement of art in schools.

As a subordinate of the Ministry of Education, the Coalition has a physical venue in downtown Oaxaca; as a relatively independent organization, it has built its own

[38] 'Castellanización' refers to the instruction of Spanish to native communities. As mentioned in Chapter 4, 'castellanización' encourages the unification of the nation under a single language, displacing the indigenous ones. In English the term would be 'Hispanization'.

headquarter in the outskirts of Oaxaca City, and has a preassigned budget for running their activities. In some cases, members of the Coalition and municipal governments have funded local reunions and programs.

### 5.1.2 The Museums Union

The Community Museums Union is a civil non-profit organization comprising almost twenty indigenous and mestizo communities throughout the state of Oaxaca. It was formed in 1991 by the fusion of community museums that had been already operating in the region. In fact, the first community museum was opened in 1985 in the Zapotec village of Santa Ana del Valle [Cohen 1999; Cohen 2001]. The Museums Union receives academic assessment form the National Institute of Anthropology and History, in terms of documenting and cataloging some of the archaeological pieces found on the location. Funding results from a combination of grants by diverse non-government organizations, sale of promotional objects, as well as donations from visitors. The museum revenues are oriented to community-oriented programs within the participating members. They currently occupy an office in downtown Oaxaca City. Its senior members comprise archaeologists, anthropologists and native people belonging to the museum committees in their local towns.

Contrary to the 'mainstream' museums, the community museums are totally built and managed by community members. Many of the features that compose a museum, such as the location, the exhibition themes, even the displayed objects, are a contribution of the community itself [Camarena and Morales, 2002]. What is more important, instead of sending objects found in excavations to bigger museums in important cities, the community museums encourage that the found objects remain within the community, so that people can see them in the original location. Naturally, this also encourages tourism, inducing visitors to get to know areas less visited within the state.

The museums are the result of the interest of community residents in having a space in which they could share the heritage, traditions and local industry with other people. In such way, native communities had a new expression forum in which they can preserve their heritage, as well as a new source of income for funding local projects. With the birth of community museums, the local community governments created 'museum committees' in which village members can occupy a 'cargo' as administrators or curators. In addition, the formation of the union provides mutual help between the participating communities, as well as the promotion of ideas among their members. As in the case of the Teachers Coalition, decisions are usually taken using the community assembly system, and the museums report to the local authorities the decisions taken in such reunions.

Since 1996, the Museums Union created a tourism-oriented branch in which visitors can get to know the communities in which the museum is located. Some of the activities include walks to important landmarks such as mines, archaeological sites or even cave paintings, a traditional meal with a family, and even special trips to the local festivities in the communities. Such type of 'alternative tourism' has been an important source of income for the communities, and attracts national as well as foreign visitors. This venture is so successful that a bilingual web page was set up promoting such tours (http://www.umco.org).

The model applied by the Museums Union led to the development of a methodology for starting a community museum in native communities beyond Oaxaca, as witnessed by the creation of community museums in other states, and the organization of a National Union of Community Museums [Morales and Camarena, 1995]. In addition, the Union has been an organizer of other community museum ventures in Central and South America, and even has links with native groups in the American Southwest. Such ties enable further cultural exchanges as well as the conception of workshops and reunions for sharing their experiences and advice. These activities are many times carried out by the actual members of the museum committees, rather than outside experts from non-indigenous groups, thus creating a "horizontal" transfer of knowledge.

## 5.2 The Training Session

During the first weekend of January 2002, we (Manuel Gándara and the author) contacted the prospect organizations, with aims of presenting the objectives of our project, as well as knowing more about the institutional objectives of both organizations. During those introductory sessions, Gándara and the author explained the purpose of the project, including a demonstration of actual Silver Stringers websites. In addition, the author explained to the prospect organizations that the software that runs the online publications could be translated into other languages. With the Teachers Coalition we even proposed the possibility of translating the software to other languages, such as Zapotec or Mixtec. The Coalition approved such idea, and even suggested to have more languages gradually introduced in the publishing tool.

After securing the approval of the organizations to deploy the technology, the next step was the teaching a course on Internet, and another one on journalism and HDL[39]. As part of this process, two questionnaires were designed for

[39] The first was an introduction/induction on what is Internet and why it is relevant to the preservation of language and culture, and was carried out by Manuel Gándara. It was more a

collection information about the participants. The first questionnaire examined a profile of the participant according to their native language, in which circumstances do they use the language, as well as their proficiency with a computer and the Internet. The second questionnaire included feedback questions related to the quality of the course, as well as brainstorming ideas for possible orientations for HDL[40].

### 5.2.1 Profile of participants

A total of 27 persons attended the two-day session that occurred in March 2002, in the computer laboratory in the Oaxaca Institute of Technology, just outside the state capital. There was a vast range of participants[41]: equally distributed between men and women, as well as comprising diverse age strata. The majority of participants belonged to the Mixtec, Zapotec and Mixe groups, but there were other ethnic groups present: one Chinanteco, two Chocholtecos and one Triqui. In addition, additional members of mestizo background (Spanish speakers) that collaborate with both groups also participated. All participants came from different regions in the state; Figure 5-1 shows the approximate location of the communities they come from.

Except for two participants, all indigenous volunteers are bilingual, but most of them know the language only in spoken form. The language is mostly used in familiar situations, but some of them also use it in community assemblies and other reunions where the authorities are present. Those of the Teachers Coalition use it in elementary school as well. When asked about their knowledge of an existing mass media format that uses an indigenous language, a great majority mentioned the indigenous radio station located in the city of Tlaxiaco, in the Mixteca region. However, participants did not mention other types of mass media, such as newspapers of television stations.

Most of the participants have relatives in other Mexican cities, as well as in the United States, mainly in California [see Rivera-Salgado, 1999]. For those who

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general lecture introduction than a workshop, due to the limited available infrastructure –but in the case of one of the organization (the Coalition) Gándara was able to obtain access to a fully equipped computer laboratory from the local public education office, that had excellent machines but a very slow Internet connection which severely limited the practical aspects of the workshop. The second course was already focused on the project itself, and was of a more practical nature. The author led this second course. The remainder of the discussion will focus on this later experience.

[40] The applied questionnaires are located in Appendix A of this thesis.

[41] It is important to note that despite our original intention, this new group was not the sum of the groups that had previously attended Gándara´s introductory sessions. Due to a variety of factors, the organizations brought in new people, with only a partial overlap with the previous groups.

had relatives living outside the country, they informed that they resided legally in the country, and few cases involved illegal migration. The most popular way of establishing contact with them is the telephone, and just in one response they contacted each other by mail. It is also very common to visit each other from time to time.

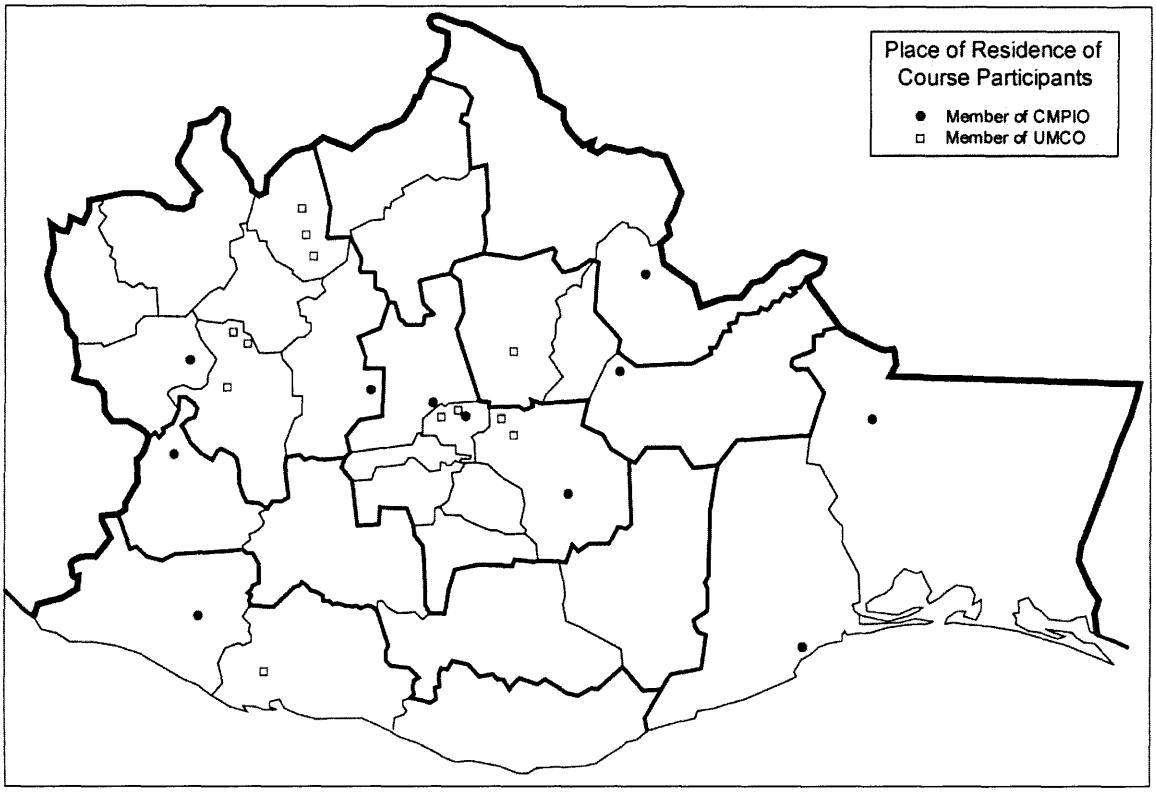


**Figure 5-1:** Residence villages of participants who attended the course, pointing out the group they belong.

The group was divided in terms of computer knowledge. While there were participants that were familiar with computer use, others had not even turned on a computer[42]. This was reflected on a question asking their 'feeling' of using a computer: those participants who had already used a computer felt comfortable, while the new users felt nervous, but willing to learn how to use them.

Despite the disparity of computer knowledge, an overwhelming majority knew or heard about Internet, even those who never used a computer before. For those who have used a computer, all of them have navigated on the Internet. When

[42] A condition we had tried to prevent with the earlier introduction/induction workshop, but as mentioned earlier, the composition of the groups changed, in part reflecting the intention of both organizations to have as many people participating as they could.

asked about their opinion on the World Wide Web, an array of answers was obtained, mentioning that it was good for obtaining information, as well as checking for e-mail (some participants had already e-mail accounts). Other notable responses included that some already knew on music downloading, as well as the availability of "harmful material aimed to the young people".

Few participants knew of the existence of online newspapers, even that the most important newspaper of the state had an online version[43]. However, participants demonstrated approval if they had the tools for uploading local information concerning their communities. Such information would be presented in Spanish as well as in an indigenous language. All participants believed that an online newspaper would give a space to their communities and languages, and would be a tool for preserving their heritage, especially to the young generations already assimilated by the mainstream culture.

### 5.2.2 Chronicle of a Course on HDL

Following the application of the first questionnaire, the first part of the course comprised an introduction to journalism. This part included basic theory, such as the parts of a newspaper, as well as the editorial process. Emphasis was put on the content of articles, as well as responsible writing. A brief exercise was conducted in which participants analyzed a newspaper article. For example, they discussed why did they chose the story, or what made the article interesting. They also made some content analysis for those articles. This exercise finished with the formation of the newspaper committees, based on the HDL editorial process. That is, the participants, according to the group they belong, decided who was going to occupy the editorial positions, such as the editors and the writers[44]. Figure 5-2 shows the committee formation process held during the workshop.

The activity was conducted in such way that they could brainstorm on the content of the actual newspaper, as well as other design issues such as sections, layout, and so forth. It is important to notice that both groups took the activity seriously, proposing several names and sections for the online publication. Many of the suggested topics were: a 'Community Board' section in which they could broadcast important information on the communities; a 'Traditions' section in which they described their cultural heritage and beliefs; a 'Who we are' section that described the main activities of their institutions.

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[43] This again reflects the change in the group composition, since both organizations had discussed the "community newspapers on the internet project" (as it was known) before accepting to collaborate in it (a paradoxical situation).

[44] This required a rephrasing of HDL´s metaphor, since according to the communal spirit already explained, there could not be just one "editor", but it had to be a collective effort.

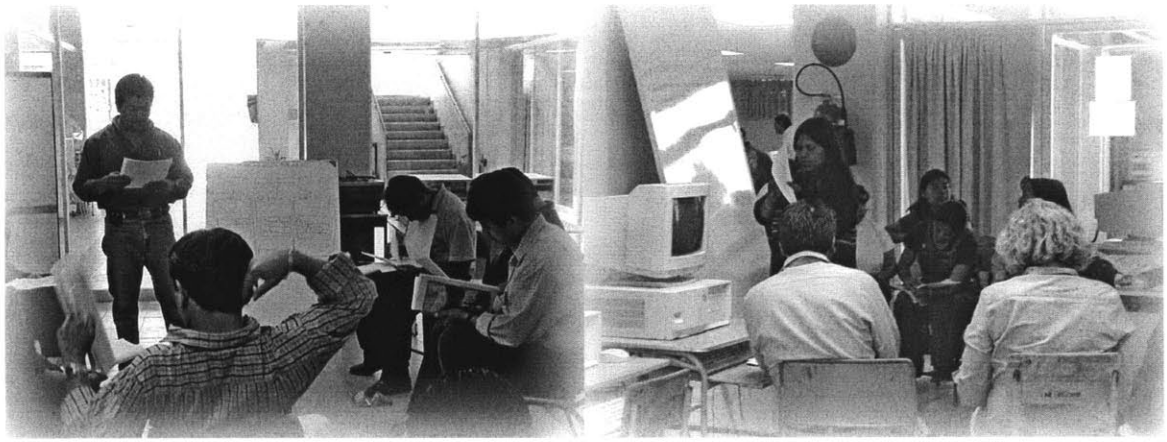

**Figure 5-2:** Discussing the formation of the editorial committees.

The second part of the course comprised a brief introduction to the Internet, covering topics such as a refresher on operating a browser as well as looking for information in the Internet. In this exercise, the participants were seated so that a person who had little or no experience with a computer was next to a participant ho had experience on their use. Interestingly, those who had experience with the Internet had the chance to do other activities, such as checking for mail, or browsing other sites. However, the seasoned "navigators" helped those with little experience to type in the browser, as well as looking for information. As a complement, the participants looked into several existing online newspapers, such as *reforma.com*, or even *boston.com*, so they could experience the differences between the written version and the online version of the publication.

An experience that proved interesting for the participants was the following exercise: I let them open a search engine, and look for information on their communities. The results were somewhat surprising for them: because many participants even did not realize that their communities have been 'on the net' already for a long time. Moreover, most of the participants have not visited the Museums Union website. For example, a participant pointed out that she found information about a researcher that went to her native community not so long ago. "I know this person!" she exclaimed. Interestingly, a great part of the information retrieved on their communities was in English, notably research papers and tourist websites. Other types of results included census data as well as newspaper articles on their communities.

The following day was fully dedicated to HDL, from the login session and creation of users, to the publishing process. For that purpose, HDL was fully translated in

'Mexican Spanish'[45], including the visual interface as well as the system messages. This step however encountered an implementation problem. Given that HDL uses XML and XSLT as languages for generating the web documents, such languages still do not recognize accented characters. The solution was to put the associated Unicode number with the instruction '**&#xxx;**', where 'xxx' symbolizes such code number. While this is a simple solution, it can pose a challenge when coding and translating the interface in other languages.

Because the installation of HDL is a one-time task, it is not considered relevant for all the participants to know how it is done, except for those who have a more complete technical background. For this reason, before the actual start of the course, the software was installed on a Windows 2000 Server. Nonetheless, it is worth mentioning the fact that there is a potential problem with the software installation. HDL requires an NT-based computer to be installed properly, since the software has been redeveloped as a service-based application, as mentioned earlier in this thesis. In addition, HDL requires the creation of two services: a database service based on MySQL, and HDL itself. Most of the computers of the computer laboratory at the university still run on Windows 9x operating systems, and access to Windows 2000 or XP remains very limited[46].

Unfortunately, the session had several drawbacks; one of them is that due to physical space limitations, participants were distributed in two adjacent rooms, separated just by a thin glass, and we had no access to a projection device. Consequently, sometimes it implied repeating the instructions twice, but the participants understood this situation, as mentioned before.

All the editorial process was taught on this second session. Grouped by pairs, users organized and entered the software for creating new users for the publication. After creating the users, they started writing the articles based on what they would like to see on the real publication. As expected, some of the

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[45] This is not a euphemism; terminology varies among diverse dialects of a same language. Additionally, terms were carefully chosen provided the cultural background of the population. As an example, I decided to translate 'basket' as 'buzón' (mailbox) and not as 'canasta' or 'bandeja'. In the Oaxacan context, people place food in a 'basket', not documents. 'Bandeja' (tray) was not an option given that it implies an office setting. The best option was 'mailbox': documents, such as letters, are placed in a 'mailbox'. However, this poses an interesting transcultural phenomenon: while many homes do not have a mailbox by itself, the 'mailbox' image is more recognized due to its association with the postal service, as well as the educational paradigm of associating a mailbox with the "semicircular-box-on-a-post-with-a-red-flag" type. [Gándara, personal communication].

[46] In hindsight, perhaps this problem could have been avoided with a better planning that would ensure that the training venue had the required configuration. But given that the original venue (one that the organizations themselves had selected and suggested as a possibility) turned out to be unavailable and this was known with very little advance notice, we had to fall back on our alternate, emergency plan.

articles gave a general overview of the participating organizations: structure, number of members, organization and projects. On the other hand, other participants related specific problems about their communities or regions, such as election conflicts or the need of basic services. In any case, it is important to point out that participants did not write on informal topics; they started thinking on the future, on the final version of the publication when it comes online. Figure 5-3 highlights some of these activities.

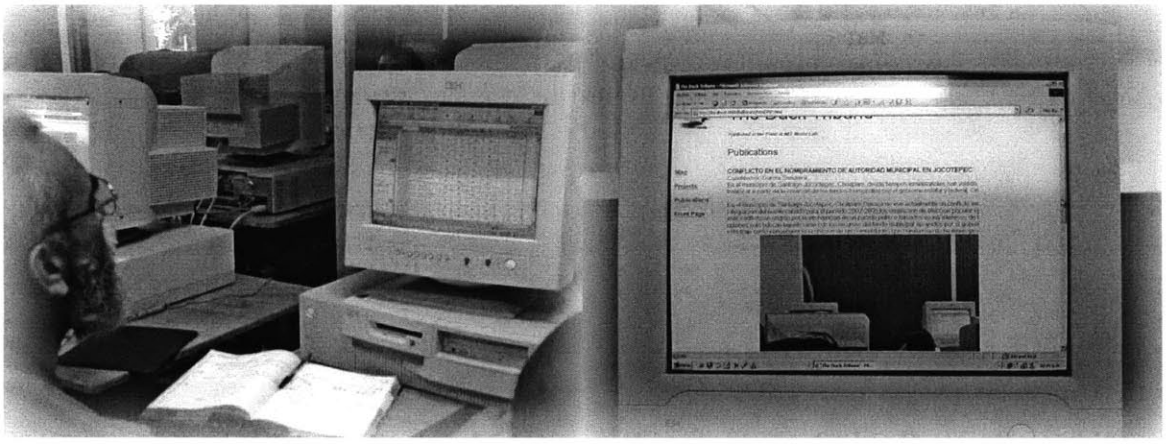


**Figure 5-3:** (left) Working with HDL, (right) One of the published articles during the HDL course; it talked about a local election conflict in northeastern Oaxaca.

Participants frequently asked questions about the interface of the program, especially because some of the procedures involved several steps. For instance, uploading a photograph into an article includes 6 steps: (1) select the media button, (2) select the 'Upload a media item' link, (3) browse for the desired image, and select OK, (4) select the thumbnail, (5) select the <img> (image) HTML tag and store it in the clipboard (via the 'copy' option in the operating system contextual menu), (6) paste the image tag into the article. For a seasoned-computer user these steps are executed very easily. However, for new computer users this poses a real challenge; it involves previous knowledge of the operating system (especially the contextual menu, which appears with a right-button mouse click). In addition, it requires memorizing 6 steps that have to be done in rigorous order. This situation resulted a two-step learning process: those who had previous experience with computers did first the tasks, and then they helped those who had little experience with the computer. Naturally, participants wrote down the steps involved in basic tasks, even for creating an article, which is the easiest task of all.

Other highlight was achieved when we reached the part of the course dedicated to digital photography. After a quick demonstration on how the camera works, some participants started to take pictures, and upload them to the articles. It is not surprising that several persons approached me asking for the price of a digital camera, and accessories. Most people knew how to use other electronic devices such as a video camera. As a consequence of this experience, I scheduled a quick course on digital photography by the end on March. Provided that the Museums Union owns four 1.3-megapixel digital cameras as well as accessories, it was feasible that the first issue of the publication would contain photographs of the region[47].

At the end of the course, an online publication was produced, full with photographs. Due to time constraints, participants demanded a recapitulation of the course in a future session. However, both organizations did a final caucus in they started defining dates for starting the publication process. In addition, a tutorial defining basic tasks in HDL was delivered to the organization leaders.

A feedback questionnaire was finally applied to participants. It included queries related to the content of the course, their opinion of the software, as well as suggestions for using HDL in their communities. In general, participants felt very well in the course. They declared that they felt more secure in front of the computer, as well as being satisfied of learning a new tool. Concerning the possible uses for HDL, ideas were diverse. Some people suggested the creation of a tourist portal for the involved communities, other recommended the conception of an 'online encyclopedia' of native communities as well as their languages. Even a participant proposed that HDL could be a front-end interface for an online store in which people could by traditional products.

People were also enthusiastic about the function of HDL as a platform for publishing in indigenous languages. Several persons visualized the system as a way for unifying the written varieties of the aboriginal languages, while others recommended creating online courses of indigenous languages. Those who did not speak an indigenous language saw this suggestion as an opportunity to learn at least some basic words or phrases in languages other than Spanish. Nonetheless, they recommended that the websites should be bi- or multilingual,

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[47] I still feel surprised when I recall the way I learned about this situation. In an informal visit to the Museum Union headquarters, about three weeks after the course, one of the administrative assistants showed me a cardboard box in the meeting room. Inside the box, there were four digital cameras, complete with SmartMedia storage cards and rechargeable batteries. The equipment is fully functional. Additionally, in the same box they had stored an old laptop computer! When I asked them the reason for storing the equipment, they explained me that some interchange students donated the equipment to the Union, and even trained them on its use, but "**no one remembered how to use the equipment after they left**" (emphasis added). Summarized in a single phrase, the resources exist but they forgot how to use it!

at least for attracting the gross of the Mexican population, of mixed heritage. A participant also recommended the inclusion of English for attracting a 'global' audience. This also got approbation, provided that this could be a way for establishing contact with relatives located in other cities, either in Mexico or in the United States.

The drawback of the course remained on the software interface, which created divided opinions. Some participants considered HDL as easy to use, while others expressed the difficult of doing some tasks, such as the described image uploading. Paradoxically, the majority of participants did not suggest changes to the current interface. Still, this was a sufficient reason to work on a 'quick reference' manual, pointing out the main tasks of HDL[48].

In summary, despite the several problems encountered in the course, the participants were enthusiastic in the use of HDL as a tool for community expression. Several refresh sessions were organized after the first course, and participants started using the interface as soon as it was installed in the Teachers Coalition offices. Still, a crucial issue remained: the Internet connection. Is it possible to have a web server in Oaxaca? How much would it cost? Such queries are answered in the following lines.

## 5.3 The Connectivity Challenge

Before reviewing the decision of installing the computer (allocated by Inttelmex in support of the project) in the Teachers Coalition headquarters, it is important to recall how the decision was taken. Probably the decision of installing the server in the capital city may sound contrary to the objectives or the project; therefore, it is necessary to justify the reasons for such decision.

The following step of the implementation project covered the connectivity issue: what is the available connectivity capacity in the state of Oaxaca? As a guiding vision, I had an ideal scenario involving total connectivity. The visualized scenario involves that each community or set of communities should be proprietary of their own HDL server, creating a network of servers that can not just support multilingual publications, but also can function as 'community portals'. In this hypothetic and decidedly utopian scenario, the computer would have become part of the community, and the goal of adoption and appropriation of technology would have been achieved.

However, Oaxaca still has communication deficiencies and lack of infrastructure. For instance, the state still has a low telephone line density: four lines per

[48] The interface issue will be discussed in detail in Section 5.4 of this thesis.

hundred inhabitants, lower than the national average of 12 lines per hundred inhabitants [INEGI, 2001]. Therefore, the core question on connection can be summarized as follows: "how to deploy a web server using the existing infrastructure, but at the same time minimize the costs of its installation as well as its maintenance?" This section centers on the connectivity challenge as part of the process of deploying the HDL server in the state, justifying the installation of the web server in the city rather than in small localities throughout the state. It also presents a brief overview on connectivity costs resulting from the proposed interface. The section finishes with a proposed connectivity scheme specifically for this project, as a result of the studied scenarios.

The findings and results of this section influenced profoundly in the definition of the methodology, challenging the original ideals of the project. Nevertheless, it provided an enriching experience for foreseen possible infrastructure problems for deploying future servers in the future.

### 5.3.1 Where should the server be located?

After the introductory course was concluded, the next task was to set up the HDL server in a location where both the Museums Union and the Teachers Coalition would have access for submitting the articles. As a preliminary step, we had to require a computer in which I could install the software. By accord between Inttelmex and the Telmex Laboratory Fellows Program, we lend a computer to the participating organizations. This was a crucial aspect in this stage of the project, because the majority of computers do not come with a Windows NT-based operating system. Consequently, we had to upgrade the computer with Windows 2000 Professional, so it could allow the installation of HDL. Such experience reflects an issue not always considered in running a computer: it is always necessary to keep in mind the equipment requirements of the software before the actual deployment of such equipment. This step can sound obvious, but because of this "obviousness" technical difficulties can arise in further stages of the deployment.

The difficult step represented looking for a location in which we could place the computer. Should it be placed in the Oaxaca City or in other location? Do participants have computer access in their communities? Do the HDL model works properly in this setting?

For answering these issues, I analyzed three different scenarios throughout the state, selected from the place of residence of some participants of the project. The premise assumed by this thesis, inspired by the Pluto and HDL distributed models of online collaboration, proposes that people would also submit their articles from their native locations. The challenge was whether this model is also

possible in Oaxaca. Figure 5-4 displays the location of the analyzed communities.

## Scenario 1: Santa Ana del Valle

Santa Ana del Valle, a one-town municipality, is located in the Central Valleys region, located 25 miles east of the capital city. It is located in a Zapotec-speaking area, having a total population of 2,000 inhabitants, many of them children and elder people. Most of the people work in traditional activities such as the production of rugs and textile products, as well as agricultural activities during the rainy season. Those who do not work in Santa Ana commute to nearby Tlacolula, the most important village in the district. There is however an important migrating sector of population that has already installed legally in California, more precisely in the metropolitan Los Angeles. People usually spend some time with families established in the United States, returning to Santa Ana from time to time [Cohen, 1999].

Access to the town is possible by a two-lane road, paved in the 1990s. Thanks to income generated from the sales of rugs as well as cooperation from migrating residents, the municipality bought two busses that offer regular service to Tlacolula. It is not surprising that some residents own vehicles, mainly pick-up trucks of American origin. The community has many basic services installed, such as electricity and running water. However, I was told that the town had only two telephones: one in the municipality and the other with a local rug producer, who obviously owns the 'caseta' (phone booth) of the community. No public phones were found.

Added to the two existing phone lines situation, and despite that Tlacolula, a 15,000-inhabitant community that accounts for more telephone lines and services, the area is still not served by an Internet service provider (ISP). This implies that a person willing to connect to the Internet would pay long distance as well as connection fees for having the service[49]. In addition, there are not immediate plans for Prodigy[50] or other Internet service provider to offer connectivity services to the region. The solution opted by several residents is a frequent commute to the capital to visit the numerous cyber cafés installed throughout the city.

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[49] Despite the relative closeness of Oaxaca City and Santa Ana del Valle, both localities are located in different area codes. Hence, a call to Oaxaca City is considered a "long-distance call". This presents a very contrasting situation with other regions such as the coast of Oaxaca, where a 100-mile strip conforms a single area code.

[50] Prodigy is Telmex's Internet service provider. Such company has the greatest coverage area in the country; therefore it is used as a reference for connectivity coverage in this dissertation.

## Scenario 2: Coixtlahuaca – San Miguel Tequixtepec

These villages are found in the eastern Mixteca region, 80 miles northwest of the capital, in a region traditionally characterized by being inhabited by the Chocholteca ethnic group. Their language registers some 530 speakers, thus catalogued as an endangered tongue. In fact, the district of Coixtlahuaca presents the lowest percentage of native speakers in the state: just 5.6% of the population knows an indigenous language. In addition, all of such speakers also know Spanish [INEGI, 2000b; 2001]. Both towns comprise some 5,000 inhabitants.

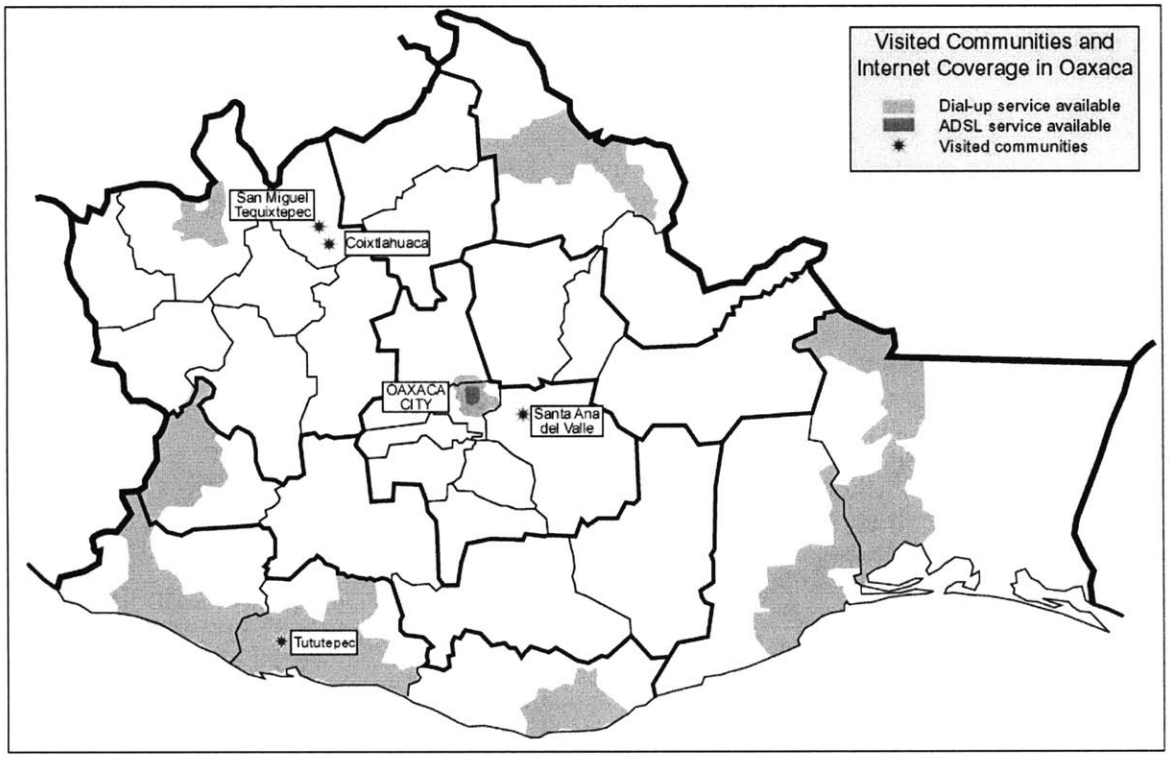


**Figure 5-4:** Internet access coverage in Oaxaca, showing location of the visited communities described in the scenarios (source of Internet coverage: Prodigy Mexico, http://www.prodigy.com.mx/int/cobertura_1.html).

Coixtlahuaca was directly benefited with the construction of a superhighway[51] between Oaxaca City and the neighboring state of Puebla, where there exists an

[51] The 'superhighway' defines a toll road but only with two lanes, one in each sense. Still it is catalogued as a high-speed road. Depending on the traffic, such roads are candidates to be upgraded to 4-lane, controlled access highways.

access road to the village. Possibly this is due that the principal attraction is a sixteen-century Dominic church, which is visited by few tourists. However, the highway does not have an exit to San Miguel Tequixtepec, but there exists an informal access ramp to a dirt road that leads to the village. The former village is building their community museum, while San Miguel had already established one in 1996.

Coixtlahuaca bases its economy on seasonal agricultural activities, as well as commerce. San Miguel Tequixtepec traditionally elaborates crafts made of palm leaf, but such tradition has been lost in younger generations. Frequent commuter trips to the capital became more common due to the opening of the highway, and both villages have also migrating communities in other places in Mexico and the United States.

While Coixtlahuaca has several telephone lines installed, San Miguel Tequixtepec, has just a single telephone line, located in the municipality offices. Coixtlahuaca had some public telephone booths, so residents of San Miguel commute to Coixtlahuaca for doing telephone calls. No Internet dial-up service is available in the area, but I was informed that there were plans for incorporating the area into the Huajuapan de León service area. Nevertheless, some people, especially young generations, also commute to Oaxaca City for connecting to the Internet, as in the case of Santa Ana del Valle.

## Scenario 3: San Pedro Tututepec

San Pedro Tututepec is one of the most populated municipalities in the state (40,000 inhabitants), located on the southwestern coastal region, and comprising some 50 towns and settlements. The most important town of the municipality is Río Grande, located on the Pacific Coast highway, linking the resort cities of Acapulco, Puerto Escondido and Huatulco. However, the county seat (San Pedro Tututepec) is located five miles from the main road, at the top of a hilly zone of the Coast region. Traditionally, the municipality has a Mixtec background, but currently the region comprises a mix of several ethnic backgrounds, including one of the few black population settlements in the nation [Pardo, 1996].

Being located 210 miles from Oaxaca City, getting there requires a 9-hour bus ride from the capital, given the difficult conditions of the road between Oaxaca City and Puerto Escondido, recently paved. Nevertheless, there is a regular service to the capital, as well as to the resort town of Puerto Escondido. Besides the interurban bus service, there are several taxi stands connecting the different communities that comprise the community.

This region is characterized by its all-season agriculture production of coffee and tropical crops. Coastal localities also benefit from a modest fishing industry. Additionally, the municipality is home of a national park: Chacahua Bays, which became recently a top ecotouristic destination, giving an important source of income for the municipality.

Contrary to what happens in the other two locations, the penetration of telecommunications is higher in this area. Many families own phone lines, and there are public telephones in the main localities. The municipality offices had recent computer equipment, with Windows Me as operating system. Additionally, an ISP serves the region, probably because it is in the same area code as Puerto Escondido. It was astonishing to find cyber cafés in San Pedro Tututepec as well as in Río Grande. However, some residents informed me that requesting the installation of a new telephone line was a process that took several months. In the case of Internet access, it also involved a long bureaucratic process. In short, while Internet is available in this area, this is still a commodity that cannot be afforded by many people.

In conclusion, the decision of placing the server in Oaxaca City obeys the still deficient infrastructure in the state. When existing connectivity services are upgraded, probably the envisioned network of HDL servers would be more feasible to execute. However, this situation directs to a possible reformulation of the HDL scheme. In all three scenarios, frequent traveling to the capital city is very common, in addition to the already mentioned cyber café services available. A possible solution could be that participants collaborating in the online publication could submit their articles not on the Web, but by personal means. That is, the collaborator or a close person that travels to where the server is located would submit a diskette containing the article, or even the article written on paper[52]. In the case of photographs, they could be scanned and later returned to the owner. In any case, the scheme could be redefined, **allowing only the use of the interface for editing and publishing purposes**. Consequently, the proofreading and discussion of the articles can be done personally[53].

### 5.3.2 Connecting the HDL server to the Internet

The three sampled scenarios gave sufficient support to the decision of locating the server in Oaxaca City. Being the capital means being at the government, education and commerce heart of the state. Therefore, it is not relevant to

[52] Walter Bender names this scheme a 'SneakerNet' model: the emulation of a message-passing algorithm, only done in 'personal' mode.

[53] This is, in fact, what has been already happening with the newspaper from the Museum Union: collaborations have arrived not only via email, but also via diskettes and print versions of the articles.

discuss the social and economic scenario of the capital. However, what it is important to mention is the connectivity scenario of the city.

In first place, the provided services are more varied in the capital than in other localities. In the third scenario, a basic dial-up service is available in the community; that is, the user would connect to the Web using the existing telephone line, at a maximum speed of 56kbps (kilobits per second). High-speed Internet access (commercialized as Prodigy Turbo, 128kbps) is available in the urban area of the capital city, and ADSL service (commercialized as Prodigy Infinitum) is only available in selected areas of the capital, such as downtown Oaxaca and other residential neighborhoods. Due to the tourism industry, cyber cafés proliferate in downtown Oaxaca; many of them started switching to ADSL when it appeared commercially in March 2002.

However, there are still few institutions that have a developed network infrastructure in their premises. As an example, Figure 5-5 shows the existing server farm in the Oaxaca Institute of Technology. The webmaster told me that in such servers they host information (web pages, e-mail services) not only of the campus in Oaxaca City, but it also host information of other campuses throughout the state. It can be seen that the arrangement is very basic, including some risky setups such as the 'no break' system shown in the right picture. It is important to mention that new equipment has been just installed in such server farm, such as a Cobalt DNS name server. The webmaster as well as the systems employees have done a great effort in integrating those technologies into their network, and have also developed their own solutions based in local necessities[54].

This is noteworthy, given that a first considered option was to host the HDL server in a local institution. Naturally, the option was later discarded because of the bureaucratic process that required such operation, as well as delegating the care of the server to a third party, something which both of the organizations we are working with would probably not be very enthusiastic about.

The best option at that moment was to physically place the server in either the Museum Union or the Teachers Coalition headquarters in the city. Having a single computer and two participating organization, we had to discussed who would take charge of the web server, while others were being negotiated with possible sponsors of the project. It was decided that the server would be located

[54] But still I get reminded of the wide gap between the capital and the provinces in terms of maintenance, equipment supply and so forth. More or less the same infrastructure was present in a private high school I visited in San José de Costa Rica last spring (San José is the country capital). Both situations were contrasting: the webmasters in San José had a complete fluency with the use of the equipment, while in the Oaxaca university the webmaster and his team still needed more training on operating new infrastructure.

in the Teachers Coalition offices, due that the Museums Union was planning to move to other location in the city. It was also agreed that the Teachers Coalition members would grant access to the Museums Union participants to enter the building for doing work with the online publication.

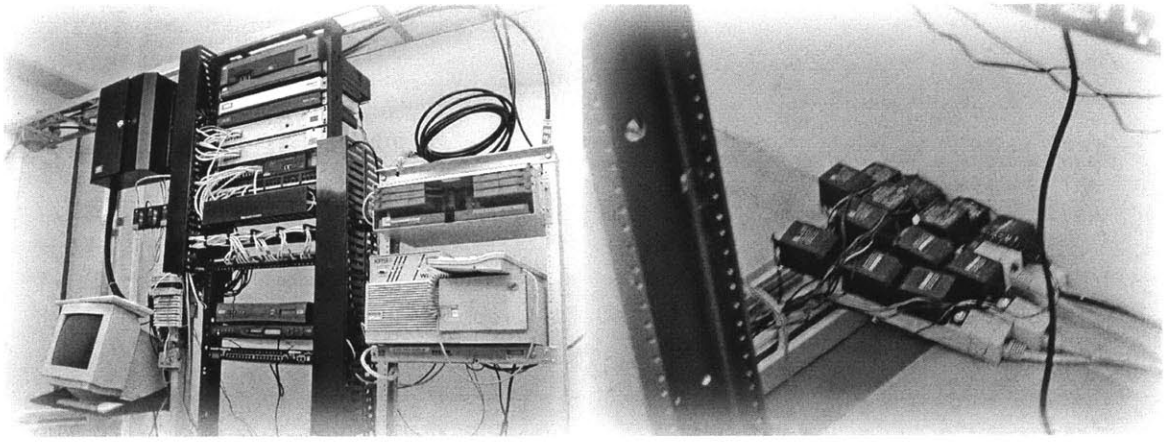

**Figure 5-5**: (left) The server room at the Oaxaca Institute of Technology, (right) An improvised 'no break' system on the same room. All the equipment is connected to these extension cords.

The Teachers Coalition headquarters is equipped with a dial-up Internet connection provided by the Ministry of Education, but connection speeds were very slow, ranking in the 9600-bits-per-second range. In this case, it was clear that the line had to be upgraded to a faster service, which could also offer the possibility of installing a fixed an IP address for accessing directly the computer. Fortunately, the Coalition is located within the service area for ADSL services. The decision for considering ADSL for the connection is because of the software requirement of an IP address (a fixed IP address was especially preferred), as well as permitting a permanent connection to the Internet, so ideally the server could be accessed at any time.

When we started to estimate the cost of maintaining a server *in situ*, some interesting figures appeared. According to the ISP, the installation cost of ADSL is about 300 US dollars. But depending on the service, the monthly fee varied from 50 to 500 US dollars per month. Which service was convenient for our project? On one side, the cheaper service would allow faster connection, but not a fixed IP address; on the other side, the expensive service provides a fixed IP address, but it allows the connection of up to 47 computers, which would imply a great misuse of the link. In addition, this implies that the expenses of the connection during the first year would be of at least 900 US dollars, without considering additional costs of electricity, network cards, or cable.

A second problem arose: who is going to pay for this? Several solutions can be proposed. One of them is to collect a monthly cooperation among the project participants to pay the monthly expenses. In an ideal scenario, everyone would cooperate and pay its corresponding part. But on the other side, it is possible that a member refuses to pay due to special circumstances, or that the corresponding fee would change depending on the number of participants. The strongest argument to reject this option is that it would give the impression that belonging to the online publication would involve becoming a member of a special group, in which members would pay a 'monthly fee'. For this reasons, this option was discarded. Let alone that the service to be acquired is provided by Telmex, which was also promoting and supporting the project: it would look like a cheap sales ploy.

Another option was to look for funding from another organization to pay such expenses. A first option was looking support from the Ministry of Education of Oaxaca. However, being a government institution implies that there is a fixed yearly budget that is assigned to the several departments that conform the ministry. A change or adjust in the budget for financing the connection would had implied a reassignment of funds already defined, as well as providing a justification. Such lengthy and bureaucratic process would have delayed the deployment of the server. Another option could be looking for an external sponsor or foundation, but negotiations would also be time-consuming.

There was a third option, which involves a more technological approach. It involves the use of a Virtual Private Network (VPN), in which the connected computers or HDL servers would be accessed using a port forwarding protocol. This scheme involves a server machine, with a fixed IP address and a defined Domain Name Server, such as http://a.location.org. Such server machine has a set of ports, as well as the location of the addresses pointed by the ports. The client machine, in this case the HDL server, would have an inner IP address within the range of the VPN set of addresses, pointing to the port 8080, which is the access port to the HDL web server. Therefore, what the port-forwarding process would do is to redirect the access to the HDL web server using the port of the central server

Figure 5-6 exemplifies the port-forward scheme scenario. There is a master server located in Mexico City, which has a list of computers connected to the private network, using the available ports in this master server. Additionally, there are two remote HDL servers already connected to the Internet, using a dial-up or ADSL connection with an internal IP address. Such internal addresses are associated with available ports in the master server, for example, 8000 and 8001. When a user wants to access an HDL server, he would type the DNS of the master server (http://a.location.org), plus the port of the desired HDL server. As a

result, the user would have access to the HDL, and by extension to the online publication.

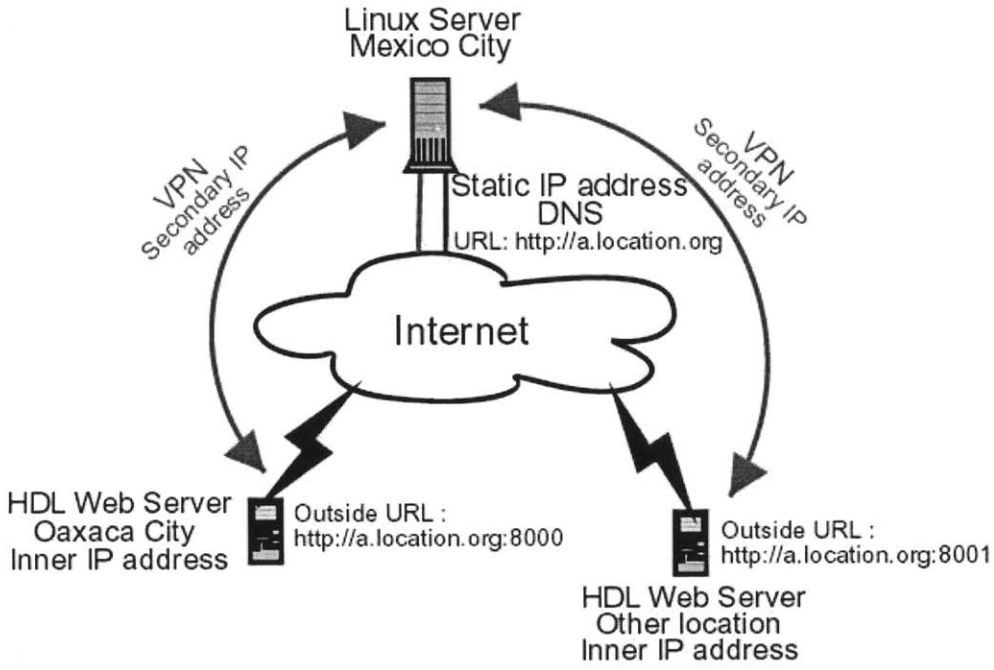


**Figure 5-6:** Accessing a network of HDL web servers using a port forwarding methodology.

There is an evident advantage of this proposed model. First, the desired objective of locating the HDL web server will be respected, thus having a centralized network of web servers managed by a master server in a central location. It is important to emphasize that the function of the central server is to grant access to the HDL web servers to the Internet using port forwarding. No information concerning the online publications is stored on the central server. The submitted collaborations remain in their respective HDL servers. This is an important consideration for our partner organizations, for which the autonomy and security of their contents is a factor of first political import.

Nevertheless, there is the need of incorporating the computers into the VPN, as well as having the necessary infrastructure for assuring a permanent connection. Back to the negotiation issues, Inttelmex offered to apply this model to an existing server in Mexico City (thus justifying the caption in Figure 5-6), as well as offering the ADSL connection service. In exchange, for keeping the connection, the Teachers Coalition and the Museums Union would agree to regularly publish a new issue of their respective publications. In this way, participants would not

pay costs derived from the Internet connection, as long as they keep publishing online[55].

### 5.3.3 The next steps

Collaborators have already submitted several articles using the 'SneakerNet' approach. As expected, the first issue of the publication deals with who are the organizations that participated on the project: the history, the mission and current projects of the organizations. In addition, several articles describe the location of the communities where they come from, complete with driving instructions. It is important to emphasize that in this first stage, many of the articles were submitted in Spanish, probably as a form of attracting the national audience, as a form of saying "look, we are here, get to know us". Nevertheless, it is expected that texts in indigenous languages will be introduced gradually in some articles, up to the point of making multilingual online resources target at indigenous and non-indigenous populations, either in Oaxaca or outside the state, probably reaching international audiences.

As for the interface of HDL, it was decided to keep it in Spanish for the moment (the interface is shown in Figure 5-7). This is because HDL is only used as a publication tool, as justified by the infrastructure problems. But the possibility of translating the software in several other languages, besides Zapotec and Mixtec remains open. With the help of the Teachers Coalition, the next step is to translate the software commands into several languages. This opens a new intriguing question, more language-centered: how to translate technical terms into other languages? Are they going to use existing indigenous terms for 'ayuda' (help) or 'crear' (create)? Will the language allow neologisms for 'usuario' (username) or 'código fuente' (source code)? Or will they opt for keeping the terms in Spanish? This will create an interesting debate on how technology terms can be incorporated in indigenous languages.

Finally, on the connectivity issue of the project, it would be possible that in a second stage, collaborators would start submitting their articles online, based on an improvement of the current communication infrastructure. In addition, based on the Internet-served areas in the state, it would be possible to start deploying a network of HDL servers in other cities of the state, tending to the original proposition of creating a network of connected communities aimed to develop new education programs, similar to Cavallo and Papert's Learning Hubs approach [2000].

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[55] At the time of writing this document, final details of this implementation are being analyzed and tests are being carried out before the official opening of the master server. However, collaborators of the online publication have already the "offline" version of the publication.

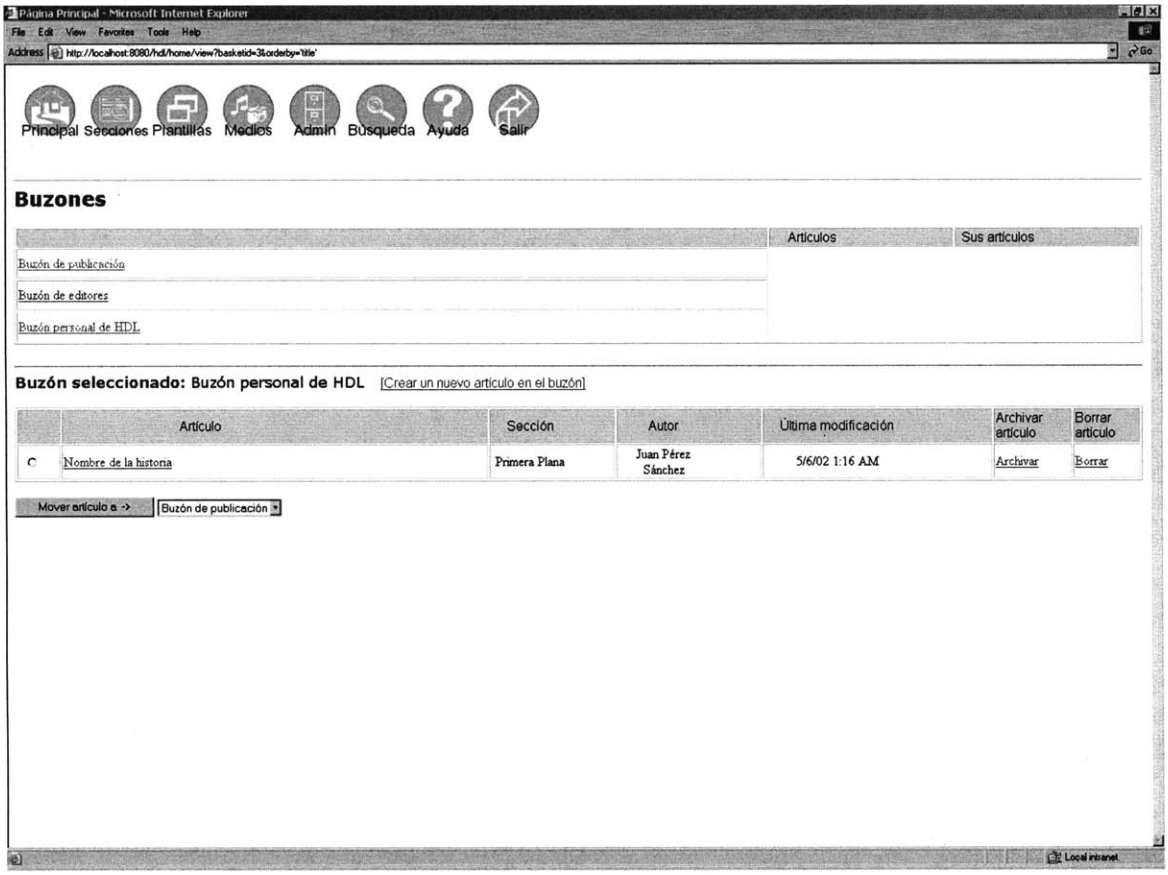


**Figure 5-7:** The HDL interface translated into Spanish.

These future actions stimulate a reflection of how applied methodology reflects on the future of the project. While there is a possibility of deploying a more statewide project with the help of the institutions, it is necessary to analyze the taken actions in order to preview possible problems or situations that did not occurred in this phase of the project. The last point of this dissertation does some reflections on these actions, proposing possible scenarios that the project may take in the future.

## 5.4 Evaluation of the Methodology

The implementation of the HDL server in Oaxaca provided an opportunity for testing the validity of the "online collaboration" model under the Silver Stringers project [Driscoll et al., 1997; Smith et al., 2000; Turpeinen, 2000]. Except for an

attempt for running an online publication in rural Thailand[56], there were no other initiatives for deploying a collaborative model in a developing setting. Nevertheless, many interesting results were achieved in this implementation process already described. For this evaluation, it is necessary to analyze two topics: what factors where evaluated with this methodology, and how to achieve the sustainability of the present project, by presenting some possible scenarios that can occur from these first steps. As a concluding point, the framework proposed for the Oaxacan project is presented.

### 5.4.1 Evaluating the implementation process

The description of the three different scenarios responds to a necessity of performing a profound analysis of the settings in which connectivity projects are proposed. The obtained results show that not always the solution to connectivity issues is just to give away computers to the regional population. It could be seen that there are still regions with not only lack of communications infrastructure, but the overall settings reflect the lack of services in which native communities are subject. It could be perceived that most of their local economies are still based on temporary agricultural practices and other local cottage industries. Consequently, the lack of development opportunities molds the commuting and migrating patterns of native residents. While some frequently commute to the capital city, others establish in other town, state or even country. Therefore, it is necessary to examine whether a collaborative framework would allow them to have access to basic services or not. If connectivity is not the solution, it is essential to satisfy the basic needs of the population before venturing in the connection issue.

As a second point, I would like to reflect on the language factor. An objective proposed by this thesis is whether the language revitalization initiatives, such as in [Donaghy, 1998], would function in a similar way in Oaxaca. While the questionnaire results demonstrated that native participants are willing to share their language heritage with other people, there is still a need of a plan for carrying out this process. As seen on the submitted stories, the participants want to let know the rest of the world that they are willing to share their culture in a frame of respect between people. Consequently, the choice of Spanish as the language for transmitting such message is justified in this case. But as expressed before, while there exists plans for gradually introducing the indigenous language, the preservation aspect of the project will still have to be fully achieved. An option could be that collaborators can begin to work on separate projects, such as the communities' portal or the crafts online store they suggested on the questionnaire. In a first stage they could use HDL as a starting

[56] The publication is available online at http://drill-press.media.mit.edu:9000/servlet/pluto, while it has not presented modifications since its implementation in late 1998.

platform, but they could opt for other options as well. It is inferred that technical support provided by a foundation or other means could be expected in that advanced stage.

For ensuring the gradual spread of the language on the Internet, it is indispensable to explore other domains beyond the written form. Indigenous communities in Mexico, notably in Oaxaca, have seen writing as a form of survival for the language. As Pardo argues [1993], the appropriation of a writing system is sometimes conceived as "a mechanism of affirmation, revaluation and development of indigenous languages" [Pardo, 1993: 109]. Paradoxically, the conception of a written system has been a result of an integrationist concept: that a writing system is characteristic of an "educated and advanced culture"; thus, indigenous communities were considered "uncivilized"[57] because no writing system was perceived by the colonizers. Consequently, the same author notices that this current tendency of looking for a written system for the language is a reflection of the integrationist model of the dominance of the majority culture: the minorities should possess writing in order to communicate with each other, in detriment of the oral tradition of the culture.

But on the other side, writing is now perceived as a form or "resistance and creativity" provided the constant imposition of the Spanish language in native cultures. Several writing systems, most of them based on the Spanish alphabet, have been proposed for representing the contrasting phonology of native languages. There is however still some discrepancy on the proposed systems, as two or more institutions or communities propose a way of writing their language. Native organizations such as the Teachers Coalition can suggest an alphabet, while outer organizations as the Summer Institute of Languages proposes other. Other communities have projected educational programs for encouraging the writing and speaking of a minority language, sometimes independent of the official syllabus for elementary education [Mena Ledesma and Ruiz López, 1996]. In any case, a premise should be kept in mind: a writing system can be developed for the native languages, but such systems must agree with the oral tradition of the culture [Pardo, 1993].

This oral tradition can be extended to the technology level as well. There are several technologies that allow sound encoding and decoding, and such approaches can be utilized for oral tasks, such as recording traditional stories, songs, or just the normal speech. New products can be conceived, such as a spoken 'journal'. Thanks to this journal, people not used to the writing system of

[57] This point is easily refuted: Mesoamerican cultures *did* have writing systems, based in pictographic representations. The literature on this topic is exhaustive. However, it is important to keep in mind that the integrationist approach creates a devaluation of the native cultures favoring dominant cultures. Following Pardo's arguments, the sign of a "developed" culture is therefore the adoption (if not imposition) of the **Latin** alphabet, thus devaluating the native writing systems.

the indigenous language can instead listen for news or other information related to their communities, in their native language[58]. It could be like the radio stations already operating in other points in the state, but with the possibility of reaching a broader audience, possibly outside the state and the country. At the end, the combination of spoken and written abilities would gradually lead to the introduction of language in other domains. For instance, with the increasing penetration of electronic communications such as the e-mail and voice over IP, participants can start using their native language in such channels, widening the communication options for the language.

The third point relates to the financial and technical support for the project. On the financial side, support was possible due to the help of Inttelmex in the specific case of this thesis. However, it is not always the case in all implementation processes. Before the announcement of the availability of the support, it was necessary to examine other possible financing sources including non-governmental organizations, civil organizations and the government. The deployment of the web server was a form of personal 'tequio' to the participating organizations. Therefore, requesting a financial aid for paying the connection was a contradiction to the original proposal of free, volunteer participation of the organizations. Arranging beforehand the financial support of institutions, as well as defining the terms of collaboration between the institutions is a crucial step for assuring a financial stability for the project. Here, the technical details of HDL, requiring a fixed IP address that in Mexico can be obtained only at a cost of 500 US dollars a month, is a severe limitation.

On the other hand, having access to technical support gives confidence to the collaborators during the first stages of the project. As explained in the profile of participants, there were people that have not had previous experience with computers. Thanks to the mutual help among collaborators, new computer users can feel more comfortable and safe when they gradually learn how to operate the equipment. However, when it comes to a failure in the connection or in the software, those who deployed the system should provide help as well as advice for finding a solution to the problem. As in the case of the original SilverStringers [Turpeinen, 2000], there will come a moment in which the users will have gained domain of the software as well as those tasks performed in a routine basis, including simple failures of the equipment. Nevertheless, the role of the technical assistance is still necessary for keeping the system well and alive. In the present

[58] It is important to keep in mind that indigenous people usually have higher illiteracy rates in Spanish. Consequently, the indigenous language illiteracy in this sector of population should be much higher. In addition, a person can be fully literate in Spanish, but illiterate in the indigenous language. Ironically, the integrationist approach is even reflected in the Census data: there is a question related with the spoken proficiency of an indigenous language, but there is no question on the written proficiency of an indigenous language. This is a clear point reflecting the argument that writing is "civilized" and just speaking is "uncivilized".

project this was done only partially, through an extended stay that had some interruptions due to external factors (among them, the Easter vocational period, which was used by the teachers to go back to their native towns). Additional, but necessarily limited, support was offered from Inttelmex in Mexico City and through visits Manuel Gándara has carried out to the project venue. Issues of cost, distance and time availability are important factors at this point.

The final issue is related with the software itself. The fieldwork done in Oaxaca provided an opportunity to test software that had been used by several groups such as children or senior adults. It provided a chance for observing possible differences of familiarity of the software. It also provided information about the interface: was it well designed, or were there deficiencies that needed to be corrected?

Based on the work of Nielsen [1983], Gándara argues that interface design contributes to a positive or negative experience with a computer [2001]. In other words, user interfaces should comply with the purpose they have been programmed to do. Both authors agree that there are some characteristics that the interface must comprise:

(1) "Learnability", or that the interface is easy to learn at getting acquainted with,
(2) "Memorability", which allows that the steps for doing a simple task can be easily memorized,
(3) Efficiency, or the art of achieving high levels of productivity after the main functions are learned,
(4) Satisfaction, which means that the user feels comfortable with the interface, and
(5) Error recovery, that implies that the software is well built, such that the user can recover easily from routine mistakes [Nielsen, 1993; Gándara, 2001].

Applying such scheme into HDL, it was noticed that the software still needs some improvements on the interface. This is evident with the mentioned example of the six steps a user usually takes for uploading an image to HDL. Additionally, HDL is a mostly text-based environment, a somewhat different approach from the now very common icon-based interfaces from proprietary software[59]. Probably a text-based interface is adequate for learning what each function does, as well as creating a database of computer terms in an indigenous langue. In a second stage, the interface could be upgraded to a more icon-based system, which

[59] A probable reason for opting for the text-based system is to give a clue on what is the activity that is going to be executed. Such approach is mainly seen in the menus, but is not very common on specific function buttons or links ('Upload a new image', 'Create a new article').

encompasses a more universal meaning, and are subtle for standardization. Gándara points out to several relatively easy improvements that could make the experience easier and less demanding: for example, given that the software is able to read the file name of the image to be inserted into an article, why should the user have to paste it manually to its intended location? At least two steps could be removed from this process.

### 5.4.2 Encouraging sustenance of the project: Possible Follow-up Scenarios

While participants have started to write articles[60], and are becoming acquainted with the use of HDL, what is the future of the project? What situations are possible after the introduction of HDL? At this moment it is possible to discuss future scenarios that the project may assume from now on, with special emphasis on possible situations not seen on the fieldwork period. A first step is already taken: support has been secured from the Center of Digital Culture (a new branch of Telmex that encourages research on new technologies) to follow up this project for at least six months.

One of the principal situations is the evaluation of the use experience of the participants. This factor is important because the interaction between the interface and the user determines in part the will of the user for continuing using the tool, and therefore the production of more issues of the online publication, as mentioned on the Nielsen and Gándara's perspectives on the characteristics of the interface. From this foundation, and based on the Oaxacan experience, it is evident that a key component for the success of the project is the software interface. The interface is the mediator between the users and the Internet, and whether the people use the software or not defines the sustainability of the project. With an inadequate or instable interface, people will feel frustrated on using the software, and thus decreasing their participation to the project, leading to the death of this initiative. On the contrary, a "tailored-to-their-necessities" interface, users can gradually increase their interactivity with the tool, resulting in the acquisition of skills and a better commitment to the sustenance of the project.[61]

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[60] In fact, there is a considerable advance in one of the newspapers (UMCO´s), that Gándara estimates at around 85% for the first issue in his last visit (May 10-12, 2002) [Gándara, personal communication].

[61] Gándara reports that given the last minute arrangements that had to be made to accommodate for the local (as opposed to the online) use to HDL, the program is more instable than it normally is. This factor required an emergency intervention, when motivation levels fell dramatically after the group lost several days of work that would mysteriously "disappear". While Gándara was unable to pinpoint the exact nature of the problem, at least a more stable access to the material

Another important factor is the involvement of people in the project itself, reflecting the degree of adoption of the proposed technology. It has been emphasized in this thesis that the purpose of a project is not to encourage solution replication, but of appropriation based on particular needs. But what in fact determines appropriation? Sometimes it can depend of the will of the participant, or it can depend on the group cohesion and identification of themselves as a group, recalling McMillan definitions on community [1986; 1996]. But are those factors enough for sustaining a technology initiative? The social aspect of the interface also plays an important role on this identification factor: probably, people are used to socially interact with each other, despite that they have to frequently travel to the capital city for such purpose. This "identification" can determine why all the editorial process is done "offline" rather than using HDL. Probably HDL has to be adapted just for the publishing part of the editorial process.

Derived from the achieved results with the first issues, other sustenance factors can be considered: the financial funding of the project; the relationship of the organizations represented with other social entities such as their native villages and other institutions (notably, the official, institutionalized educational apparatus); the assurance that the resulting publications reflects the points of view of the institutions represented (whatever they are), and thus have no biased elements, especially from outer sources.

These factors can be summarized in two main components of the follow-up process of the framework, which I can resume with the words **interface** and **interactivity**. Hence, from such components I can visualize two scenarios from this initial deployment of the software, reflecting the two extreme situations that can occur.

## A worst-case scenario

In this kind of scenario, many submissions are uploaded not having enough writing quality. Most of the content is biased or not reflecting the original guidelines of the publication. In addition, the online publication is still written in national or international languages, leaving no space for the native language. This case contradicts the expected spread on the use of minority languages online. It is also feasible that articles are not submitted as often as expected, or that editorial meetings are not held at frequent intervals.

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was found, which was crucial to bring back the interest and the confidence of the users [Gándara, personal communication].

Among the participants there is misappropriation of the committee positions, deriving that only few people remain in the high hierarchy positions in the editorial structure. The combination of such situations lead to internal conflicts that arise within the organizational structure of the publication, gradually resulting in loss of interest of participants on the initiative, and a weakened sense of belonging to this committee.

After the implementation of the project, the software presents inconsistencies, such as problems with the interface and programming errors. All of the capabilities of the software are not fully exploited, or the software is not tailored to the users' needs. Such situations derive in dissatisfaction of the participants, who gradually decrease use on the software, widely depending on outside technical support. In a worse case, little technical or literary support is provided from the project sponsors, contributing to an increasing frustration from the participants, also deriving on the loss of interest for using the software.

Municipalities that once supported the project gradually decrease the support to it, by dissolving the municipal "committees of the publication" previously formed. The same situation happens with external institutions that, given that there are no results from the project, stop providing finance and technology assistance to the online publication project. Communications infrastructure required for sustaining the network is never deployed, or is deployed incompletely. Internet remains a service restricted to important population centers, attracting only young people.

The combination of these situations derives in the gradual death of the project, resulting in frustration of the participants and the loss of an opportunity to connect minority cultures to the Internet. A feeling of lack of confidence will remain from the project, and the implementation of similar projects will encounter more obstacles than advantages for the inhabitants of the native regions. The situation after the project remains the same or worse than in the beginning of this initiative; or probably worse, since the project has "vaccinated" users against Internet.

## A best-case scenario

On the other extreme, in a best-case scenario the sustainability of the project is assured, involving not only the participation of the original organizations, but involving external organizations, governmental or non-governmental, from the state or from abroad.

Collaborators submit their articles on the times defined by the editorial committee. Such articles are well documented, reflecting the particular

perspective of participants on the treated issues, and are submitted in several indigenous languages as well as in Spanish. Additionally, other media files are submitted, such as videos or audio recordings. The participants have gradually acquired the skills for operating the necessary devices for uploading such objects into the publication.

Participants actively get involved in all possible roles within the committee, accomplishing the goals set by all participants. Positions within the organization are rotated from time to time, allowing everyone to be responsible of a monthly or bimonthly issue[62]. Volunteers like being in the group, and believe that their participation is important in the success of the publication.

The software used for the project has few or no bugs at all, covering the needs of the project participants. An enhanced version of the software is developed, allowing a multilingual platform in which participants can operate the software regardless their native language. Participants feel more comfortable with the software, becoming seasoned experts after a while. Technical and literary specialists assist the editorial committee from time to time, solving together possible problems that may occur. On a second stage, the editorial committee adopts the software for projects other than online publishing, inviting other members of the community to participate.

Municipalities involved in the project realize the potential on the online publication approach, so they start working with the editorial committee on projects focused on a municipal or regional scale. Other institutions would like to get involved as well, and allow the project to be programmed in their yearly budgets. Such funding allows the paying and maintenance of the equipment, and permits from time to time an upgrade of existing equipment. More communications infrastructure projects deploy in the involved regions, permitting not only the creation of a more regional scheme of online publication servers, but also allow to run tests of other approaches such as PDA's, voice-over-IP or wireless LANs (local-area networks), resulting in the actual test of such technologies in other settings, such as rural or isolated communities.

From this experience, the project thrives, and native languages are exposed to other approaches for the preservation of their language. Gradually, indigenous languages increase their presence not only on the Internet but in other media as well. With a new channel available, people that identify with the participant groups can get in touch with them, despite the geographical location. The sense of community is reinforced within the ethnic groups, leading to a more recognized presence in the national society they belong. At that moment, the nation will

[62] The latter is, by the way, the minimum periodicity for the newspapers of both organizations.

recognize native groups as strong communities with their very own customs, but also willing to participate in the welfare of the country.

## Conclusion

As mentioned before, both scenarios represent extreme cases of the project, and the proceedings deriving from the implemented framework will be noticed until a few months, probably years. Naturally, the framework is oriented towards the best-case scenario, but problems can occur at several stages of the life of the project. It would be necessary to prepare concise solutions to such problems, and thus maintain the principal objective of the project. For now, the first step has been taken, and the follow-up of the initiative will determine if this is a success or a failure story of technology implementation.

### 5.4.3 The Oaxacan Framework

In conclusion, the deployment of HDL on Oaxaca provided an opportunity to examine how the applied methodology as well as the software determines the creation of a collaborative environment as a first step for giving strength and presence of minority languages on the Internet. Such is a process that takes time to concrete, depending on the motivation of the people, the available infrastructure and the adequate use of the software solution. I close this chapter with the final framework proposition based on the resulted observations. As stated before, this is not intended to be a recipe or an algorithm to be applied in all cases. Each case in unique, and would require emphasis in some points.

1. **Necessity:** What are the current needs of the target community? How does language plays a role on obtaining such needs? Can electronic publishing can help satisfy such needs?

2. **Language:** What is the background of the target language? Does it have a written standard? Do people know this written standard? What is the dialectal variation within the language?

3. **Infrastructure:** What is the existing communication infrastructure in the region? What is the current Internet infrastructure? Are there plans or projects involving the target communities? Is it possible to choose from a specific ISP?

4. **Culture:** What are their traditions, their heritage elements? What are their organizational structures? How open are they to new technology? Does the introduction of new technology collide with their traditions?

5. **Design of Solution:** What is the form that the solution will take? A program? A device? Is it possible to perform tests? Is the target language compatible with the developed solution?

6. **Interface:** Is the interface well designed? Does the interface comply with usability criteria (error recovery, satisfaction, etc.)? Is the interface being tested?

7. **Funding:** Does the deployment of the project involve income sources? What are existing options for funding? Is there a need to make legal arrangements or agreements?

8. **Promotion:** How should we recruit possible participants? How to introduce the project to such audiences? Is it open to the public or restricted to a certain sector?

9. **Preliminary Tests:** Is it possible to perform tests before the deployment? Do the elements need changes before its implementation? Are such tests executed under controlled or natural conditions?

10. **Training:** Do participants need previous knowledge on a certain topic? Are participants learning the required skills? Is there a reference for the participants to consult?

11. **Brainstorming:** What are possible uses for the interface? Are such solutions destined to help the native language?

12. **Consulting:** Is support or consulting available after the training? What types of support are available? It is necessary to train people on a new skill? Is there a program for creating on-site consulting?

13. **Evaluation and follow-up:** Are the results expected? Do unexpected situations occur? Do participants still feel motivated of participating in the project? How often does the software require an update? Is continuity of the project assured (change of participants, involvement of other organizations, and so forth)?

# Chapter 6. Conclusions and Future Work

The Internet is a powerful medium that allows access to the knowledge of other cultures regardless of the distance. Today we can travel to other places without leaving our desks, and therefore know more about the cultural mosaic that conforms our world. Such mosaic is enriched by information generated by the local inhabitants. Having a more egalitarian access to the Internet would allow the cyberspace to be an alternate world in which several cultures can gather and express themselves.

It has been demonstrated in the work of the SilverStringers project that active community publishing generates localized content, as well as enabling participants to engage in an online collaborative environment, in which they can exchange ideas. The proposed framework achieved a similar objective: using a combination of analog and digital journalistic process, participants created articles that reflected their sense of belonging to a native community. They demonstrated as well a will to share their heritage to other people, and hence extended an invitation to potential visitors to know more about the heritage that they represent as natives of Oaxaca.

The proposed network can be considered as the beginning of development of communication infrastructure in isolated zones in the nation. Naturally, basic needs such as water and electricity are top priority in developed countries, and cannot be replaced by giving away computers. It is compulsory to foresee what is the expected use of the computer equipment that is being distributed to marginalized communities, and whether it is necessary to supply the communities with such tools.

The minority-language presence on the Internet would take some time to develop, but the first step is taken. It has been demonstrated that current technologies can allow the deployment of a web server that can be accessed using a virtual private network, and that such arrangement can allow the conformation of small “nodes” in which a master server can manage several online servers. The proposed software can be translated into other languages, but in a first stage a national language can be used if several native groups are present.

Participants of the course proposed several ideas for HDL; such ideas could involve the participation of communities separated by a long distance. A probable development of the tool can comprise the creation of publications aimed at migrating communities in the United States, so they can still keep in touch with

their native regions.[63] Using a distributed server scheme like the one presented in the thesis, municipalities team up and build information portals in which they can display local news and events. Teachers can conceive sites in which course material in indigenous languages can be developed and uploaded. With the help of a digital video camera, participants can upload a video journal in which they can summarize the main events in their communities, or upload promotional material for tourism purposes. Participant can create a discussion form in which they could discuss other issues as well.

However, it is also suggested that special care should be considered at the time of deploying framework components such as the financial factor and the software interface. In the financial aspect, it is important to analyze current infrastructure deficiencies and schedule an upgrade. It is also important to engage the contribution of foundations or other institutions in language and culture revitalization projects. On the interface side, probably the software would need several adjustments, like the reintroduction of image tags, or the creation of templates without the need of coding HTML. Another possibility is to add a multilingual module to the administration interface so that the same administrative tool can be accessed in different languages. As mentioned in the text, it is possible to modify the interface to include a more icon-based environment.

This language framework can be extended to other environments as well. In the concrete case of Mexico, such initiative can help government-sponsored programs as e-Mexico (http://www.e-mexico.gob.mx), which aims to provide connectivity to every sector of the population. While such initiative has a very ambitious goal, care should be taken in the implementation phase, in which people really get engaged in the programs envisioned by the organizers, such as remote education, health programs, and online government presence. There exists a risk that such "learning hubs" could get converted into cyber cafés. A framework like the one proposed could help the deployment of such ambitious programs, and really accomplishes educational and human goals, rather than a massification of technology. That was what happened with television: many people considered that such invention would fulfill educational needs of population, but the reality demonstrates a quite different scenario.

In summary, the purpose of this work was to brainstorm and implement strategies in which native languages and the Internet can get along, without affecting the traditions of the target groups. As social structures have defined the way of life of native cultures for many centuries, the Internet can gradually incorporate to that structure. If adapted properly, it can cause great changes in people and provoke a revaluation of native cultures and heritage. In a so-called

[63] This aspect arose the interest of Center of Digital Culture.

'global world', isolation is not a viable option, but assimilation is not the form for establishing relationships among cultures. The basic principle of respecting the other's rights should be obeyed all the time, even in technology. The same thing happens with language: is it necessary that few languages dominate cyberspace? It is commonly stated that being in the Internet is having a voice. It is time to make such statement universal.

The success or failure of the project depends on the follow-up of the proposed framework, as well as a careful analysis of individual steps taken in the process. The first steps have been already taken; the only task remaining is to ensure that the project maintains its interest with the participants, as well as not detouring of the main objective: provide the indigenous languages with a new space of communication. A participant in Oaxaca told me: "with the Internet, at least we will have conquered another space". Hence, the Internet should encourage the existence of all the necessary spaces for every available culture in the world. Cultures around the world have been getting acquainted in this new space, something thought impossible some decades ago. By respecting the cultural heritage of its inhabitants, regardless of its ethnic origin, the world will conserve its diversity. And I am certain that language will remain the main key to have access to such heritage.

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# Appendix A: Applied questionnaires[64]

## A.1 Precourse questionnaire

1. ¿Es hablante nativo de una lengua indígena? ¿Cuál?
[ Are you a native language speaker? Which one? ]

2. ¿En que situación usa su lengua indígena? (escuela, trabajo, familia, etc.)
[ In which situations do you express in this language? (school, work, family) ]

3. ¿Cómo se expresa en su lengua indígena? (hablado, escrito)
[ How do you express in your native language? (spoken, written) ]

4. ¿Conoce algún medio de comunicación que utilice alguna lengua indígena? ¿Cuál o cuáles?
[ Do you know mass media that uses a native language? Which one(s)? ]

5. ¿Qué experiencia tiene en usar una computadora?
[ Do you have experience using a computer? ]

6. Si ha usado una computadora, ¿cómo se siente al usarla?
[ If you have used a computer, how do you feel? ]

7. ¿Conoce o ha oído hablar de Internet? ¿Lo ha usado?
[ Do you know or have you heard about Internet? Have you used it? ]

8. Si conoce o ha usado el Internet, ¿qué piensa del Internet?
[ If you know or have used the Internet, what do you think of it? ]

9. ¿Conoce o ha oído hablar de los periódicos en línea?
[ Do you know or have you heard of online newspapers? ]

10. ¿Tiene familiares que vivan fuera de su comunidad? ¿En dónde?
[ Do you have relatives living outside your community? Where? ]

11. ¿Cada cuando contacta con ellos? ¿Cómo se comunica con ellos?
[ How often do you communicate with them? How do you communicate? ]

12. Si se publicara un periódico en su comunidad, ¿apoyaría o rechazaría la idea? ¿Porqué?

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[64] The questionnaires were applied in Spanish. The English translation is indicated for referential purposes.

[ If a newspaper were published in the community, would you go for or against the idea? Why? ]

13. Si apoya la idea, ¿qué le gustaría ver en ese periódico?
[ If you support the idea, what would you like to know? ]

14. ¿Quién leería este periódico?
[ Who would read that newspaper? ]

15. Si este periódico estuviera en el Internet, ¿lo daría a conocer a su comunidad? ¿lo anunciaría a sus amigos? ¿lo anunciaría a sus familiares que viven fuera de su comunidad?
[ If such newspaper were on the Internet, would you let the community know about it? Would you tell your friends about it? Would you tell your relatives living outside your community? ]

16. ¿Escribiría este periódico en alguna lengua indígena? ¿Haría la publicación en más de un idioma?
[ Would you write such newspaper in an indigenous language? Would you publish in more than one language? ]

17. ¿Cree que un conjunto de periódicos en lengua indígena estimulará el aprendizaje del idioma?
[ Do you believe that a set of indigenous-language newspapers would stimulate learning of that language? ]

## A.2 Feedback questionnaire

1. ¿Participaría regularmente en el proyecto de periódicos comunitarios?
[ Would you participate regularly in the community publication project ? ]

2. ¿Invitaría a otros miembros del grupo que no asistieron al curso a participar?
[ Would you invite to collaborate to other members that did not attend the course? ]

3. ¿Mejoró o empeoró su experiencia frente a una computadora? ¿Por qué?
[ Did your experience with a computer was good or bad? Why? ]

4. ¿Fue para usted fácil o difícil de usar el programa HDL? ¿Qué le cambiaría?
[ What is easy or difficult the use of HDL? What would you change in the program? ]

5. Aparte de la realización del periódico, ¿utilizaría este programa para algo más? ¿Cómo qué?
[ Besides for the elaboration of a newspaper, what other use would you give to the software, if any? ]

6. Si va a participar en el proyecto de periódicos comunitarios, ¿le gustaría que la herramienta fuera traducida a alguna lengua indígena?
[ If you are participating in the community newspaper project, would you prefer that the program be translated into an indigenous language? ]

*(depending on the case, participants answered question 7 or 8)*

7. Si habla una lengua indígena, ¿cree que el periódico comunitario ayudará en la difusión oral o escrita? ¿porqué?
[ If you speak an indigenous language, do you believe that a community publication would help the spread of the oral or written language? Why? ]

8. Si no lo habla, ¿cree que el periódico le ayudará en aprender una lengua indígena?
[ If you do not speak an indigenous language, would the newspaper encourage you to learn it? ]

9. ¿Qué significo para usted haber participado en este curso?
[ What does it mean for you having participating in this course? ]

10. ¿Qué le pareció el curso (material, actividades, profesor)?
[ What do you think about the course? (material, activities, instructor) ]

*Muchas gracias por su participación en el curso. [ Thank you for your participation in the course ].*